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OCTOBER ▪ ▪ ▪ 1938

ROXALIN

makes the complete line!

BLUE KNIGHT FINISHES
Cover the full drying range.
For Quick High Bakes—ROXYN 11-C.
For Short Low Bakes—ROXAPRENE.

375° F SHORT HIGH BAKE

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- **Requires no primer**
- **Sticks to brass, aluminum, steel and die castings**
- **Is so permanently flexible it permits forming after ten years aging**

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BLUE KNIGHT FLEXIBLE LACQUERS

—And there is no premium asked for these production and service advantages.

Here is the actual finish!
(Embossed after lacquering)

Twist it!
Bend it!
Prove its adhesion—its flexibility!

75° F QUICK AIR DRY

THEN—send for your sample TODAY!

After you test this strip, put it away for a year, or two years, or ten. This finish will still "take it".

ROXALIN FLEXIBILE LACQUER CO., INC. • BOX 7810 • ELIZABETH, N. J.

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PRODUCTS finishing

HOWARD CAMPBELL, Editorial Director
FRED W. VOGEL, Managing Editor

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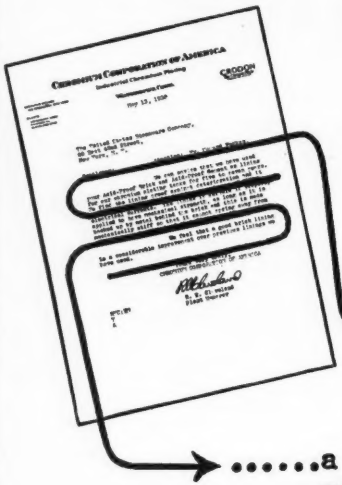
More Than 15,000 Circulation This Issue

CHROMIUM CORPORATION OF AMERICA HAS THIS TO SAY ABOUT "U. S. STONEWARE" ACID-PROOF BRICK-LINED TANKS



"We have used your Acid-Proof Brick and Acid-Proof Cement as lining for our chromium plating tanks for 5 to 7 years .....

.....a considerable improvement over previous linings we have used."

So says Mr. R. E. Cleveland, Works Manager of the Chromium Corporation of America, Waterbury, Connecticut.

This is convincing proof of the durability and superiority of "U. S. Stoneware" Acid-Proof Brick and Acid-Proof Cement for tank linings to handle the strong acids and electrolytic action encountered in chromium plating and similar processes.

Have you heard about our New "Tygon" Synthetic Rubber Covered Pickling Tanks for pickling stainless steel parts and guaranteed to withstand mixed hydrofluoric and hydrochloric acids?

THE U. S. STONEWARE CO.

WORKS (SINCE 1865): AKRON OHIO

PRODUCTS finishing

CINCINNATI, OHIO VOL. 3, No. 1

OCTOBER, 1938

20th National Metal Congress and Exposition

FROM Monday, October 17, to Friday, October 21, the city of Detroit, Michigan, will be host to metallurgical and mechanical engineers, production men, executives, salesmen, professors, students, and industrialists from all over America who will be gathered there to attend the 20th National Metal Congress and Exposition. Incidentally, the visitors will also probably take advantage of this opportunity to visit the great automobile factories for which the city is famous, to see and learn something of the skill, precision, and manufacturing speed in which the automobile industry is the acknowledged leader.

The visitors will be members of the American Society for Metals, American Institute of Mining and Metallurgical Engineers, American Welding Society, The Wire Association, and the members of the British Institute of Metals and the British Iron & Steel Institute, which two institutes are holding their annual fall meeting this year in the United States. For five days these visitors will attend meetings and technical sessions, banquets and luncheons, and will inspect the interesting displays of the huge Exposition in Convention Hall and visit the city's great factories.

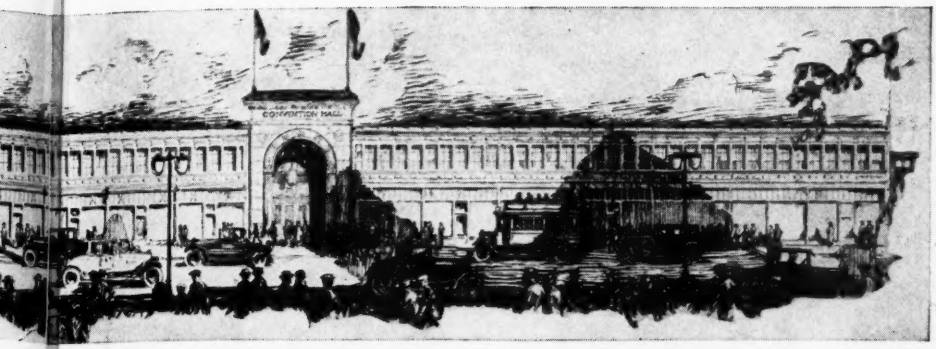
The feature of the National Metal Congress will be a round

Convention Hall, Detroit, Michigan, where the 20th National Metal

table discussion of "The Nature of Hardness." The meeting will be held on Wednesday evening, October 19, at the Hotel Statler, and is sponsored by the Physics of Metals Committee—an independent group organized last year. John T. Norton, Massachusetts Institute of Technology, is chairman of the committee and D. E. Ackerman, Purdue University, will be chairman of the Detroit meeting.

The subject will be discussed under seven headings with discussion leaders as follows: "Mechanical and Metallurgical Aspects of Hardness", S. L. Hoyt, Chief Metallurgist, A. O. Smith Corporation. "Work Expended in Indentation Hardness Tests", J. J. Kanter, Research Metallurgist, Crane Company. "Physical Quantities Relative to Inter-Atomic Forces (Hardness)", E. U. Condon, Associate Director of Research, Westinghouse Electric & Mfg. Co. "Relation of Compressibility to Hardness", H. W. Russell, Physicist, Battelle Memorial Institute. "Relation of Plastic Behaviour to Hardness", R. H. Heyer, Research Metallurgist, American Rolling Mill Co. "Plastic Deformation of Metallic Single Crystals as Related to Hardness", N. Gensamer, Dept. of Metallurgy, Carnegie Institute of Technology. "Quantum Mechanical View of the Inter-Atomic Forces Relative to Hardness", (Speaker to be announced).

The American Society for Metals program will include 48 papers on a variety of subjects connected with the treatment of metals. Education lectures on special subjects will be given each day of the meeting, at an hour which will not conflict with the



Congress and Exposition will be held October 17 thru October 21.

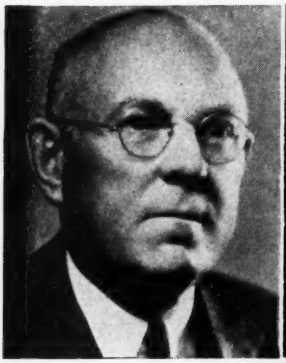
regular sessions. The Campbell Memorial Lecture will be given at the annual meeting on Wednesday morning, and the annual banquet of the American Society for Metals will be held Thursday evening, October 20.

The American Institute of Mining and Metallurgical Engineers program will include some 30 papers on subjects of interest to this group, a round table discussion on "The Nature of Hardness", and the annual science lecture of the A. I. M. E. which this year deals with "Gases and Metals."

At the 19th annual meeting of the American Welding Society, 47 technical papers are scheduled to be read covering a wide range of subjects of interest to users of welding. Special sessions will feature fundamental and industrial research and a day will be devoted to subjects of interest to the automobile group. The annual banquet will be held Thursday evening, October 20, at which W. J. Cameron of the Ford Motor Company will deliver the keynote talk. Awards will be made of the Lincoln Gold Medal and the Samuel Wylie Miller Memorial Medal.

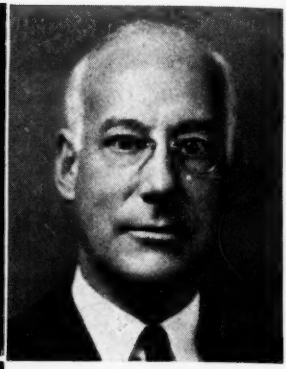
Some 17 papers will form the basis of discussion at the sessions of The Wire Association, the Non-Ferrous Division and the Steel Division meeting simultaneously.

At the National Metal Show, more than 230 leading industrial firms will be represented by displays among which will be a number of actual operating exhibits presenting the newest developments in materials and equipment. To the visitor at the show these exhibits will comprise a graphic exposition of the manner in which science has advanced



(Above) W. P. Woodside, *Vice-President, Climax Molybdenum Corporation.*

(Above Center) G. B. Waterhouse, *President, Massachusetts Institute of Technology.*



(Above) Bradley Stoughton, *Treasurer, Lehigh University.*

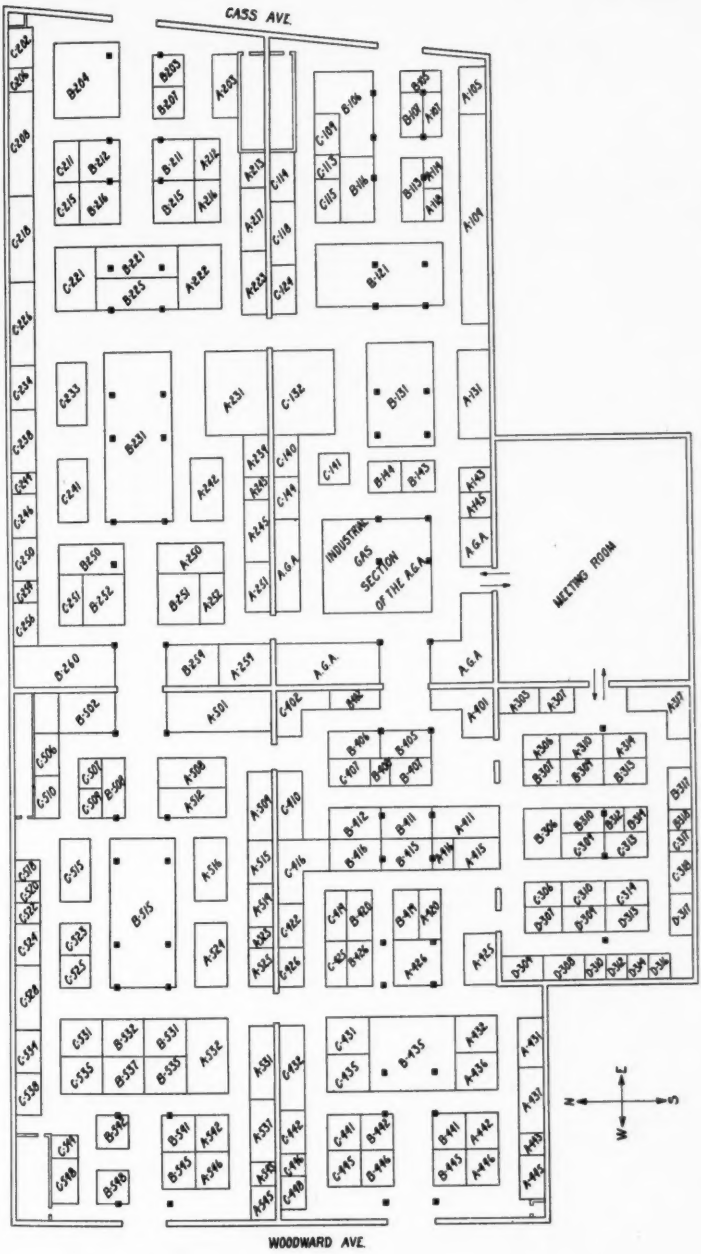
(Left) W. H. Eisenman, *Secretary.*

Officers of American Society for Metals

the working of metals, year by year, and the extent to which industry depends upon the scientists and research engineers for the answers to its technical problems. Attendants will be on hand at each exhibit to discuss problems and answer questions relating to the products and equipment on exhibition.

Registration is the only requirement for admission to the National Metal Congress for any engineer, technician, or executive engaged in any phase of metal manufacturing.

The committees in charge of arrangements have made every effort to make this National Metal Congress and Exposition the most outstanding in the annals of the participating societies.



Floor Plan of the National Metal Exposition

EXHIBITORS

at the

NATIONAL METAL SHOW

Acme Steel Co.

Chicago.

Booth A-310

In attendance: A. L. Moll, sales manager, Strip Steel Division; P. W. Holmes, assistant sales manager, Strip Steel Division; J. E. Kugelman, sales department, Strip Steel Division; C. S. Henderson, sales engineer; V. C. Hogren, advertising manager; Detroit sales representatives: L. D. Rockwell, K. G. Schairer, Russell Wykoff, K. J. Pedersen, and R. E. Crabb.

Exhibiting (in operation): The complete line of Acme Superstrip, including hot and cold rolled as well as stainless and galvanized. Of particular interest will be the exhibit of strip steel in colors and with rolled-in designs. A new development is an electro galvanized strip steel with a permanent bright lustrous finish. The care with which Acme Superstrip is packed for shipment will be demonstrated as the application of these methods may effect savings for other shippers.

The Aetna-Standard Engineering Co.

Youngstown.

Booth C-416

In attendance: Jerome R. George, president; Carl G. Ohlson, vice president and general manager; C. L. Taylor, vice president and senior engineer; H. W. Smith, manager Tube Mill & Cold Drawing Division; F. P. Dahlstrom, electrical engineer; H. G. Coffey, assistant to general manager; J. D. Lawrence, Detroit representative; E. J. P. Fisher, assistant manager, Tube Mill and Cold Drawing Division.

Exhibiting (in operation): The 12-inch Aetna-Connor Continuous 5-draft wire drawing machine will be operated in actual production of high carbon steel wire to demonstrate its advantages in design, manipulation and speed.

It will be powered with one 30 H.P. variable speed D. C. motor. All drawing blocks and dies will be thoroughly water cooled to allow maximum wire drawing speed with superior wire quality. It will be equipped with auxiliary stripper crane, safety tangle switch, wire pointer, etc.

The 22-inch Aetna Continuous 3-Draft wire drawing machine will consist of three individually motor driven drawing block units, placed in line and arranged for continuous wire drawing.

It will be operated to demonstrate starting, stopping, and speed control of the drawing blocks. Equipped with auxiliary stripper crane, etc.

Ajax Electric Co., Inc.

Philadelphia.

Booth B-116

In attendance: Dr. G. H. Clamer, president; Wm. Adam, Jr., vice president; John E. Haig, secretary; J. E. Bullock and Lloyd Williston, Detroit representatives; A. A. Anderson and E. E. Bolds, Ohio representatives; and Ben L. Crew, Chicago representative.

Exhibiting (in operation): Ajax-Hultgren Salt bath furnace in operation, demonstrating the use of this furnace for carburizing, cyaniding, scale free hardening, tempering, annealing, and hardening high speed steel tools.

Photographic display of recent Ajax-Hultgren Furnace installations, and other Ajax Electric Company heat treating furnaces. Moving pictures showing furnaces in actual use.

Ajax Electrothermic Corp.

Trenton, N. J.

Booth B-116

In attendance: Dr. G. H. Clamer, president and general manager; Dr. E. F. Northrup, vice president and technical adviser; Dudley Willcox, treasurer and assistant general manager; Robert N. Blakeslee, Jr., secretary and sales manager; Frank T. Chestnut, electrical engineer; A. D. Meyer, sales metallurgist; H. G. Remmers, electrical engineer; and G. F. Applegate, superintendent.

Exhibiting (in operation): A high frequency billet heater is shown in operation with electric eye control of temperature. Also pictures of laboratory and commercial size melting equipments.

Allegheny Ludlum Steel Corp.

Watervliet, N. Y.

Booth C-402

In attendance: W. L. Weaver, special representative, in charge; H. I. Askew, J. J. Cruice, A. L. Hope, Geo. Eger, K. L. Clark, manager FCC products; A. K. Martin, Thos. Moorman.

Exhibiting: Tool steels; Nitraloy; FCC products.

Allegheny Ludlum Steel Corp.

Brackenbridge, Pa.

Booth A-512

In attendance: V. B. Browne, vice president in charge of research; C. A. Scharschu, di-

rector of research; V. N. Krivobok, associate director of research; R. M. Allen, assistant to president; W. R. Grunow, special representative; H. N. Arbuthnot, district sales manager (Detroit); C. R. Brinke, sales representative, Detroit office; M. F. Findley, sales representative, Detroit office; J. W. McKnight, sales representative, Detroit office; and Clark W. Green, in charge of exhibit.
Exhibiting: Display of Allegheny Metal and an educational section showing the fabrication of Allegheny Stainless Steels, examples of welding with test samples as well as examples of spinning, drawing and machining. An interesting display of Ludlite along with technical information covering the application of this new product.

Alox Corporation
Niagara Falls, N. Y.

Booth B-408

In attendance: James E. Shields, technical sales manager; Dr. A. W. Burwell, vice president and technical director; W. H. Clark, president; James W. Doyle, Detroit representative of Alox Corporation.
Exhibiting (in operation): Various types of anticorrosion products, applicable to ferrous, non-ferrous and alloy metal protection. Various pieces of metal coated and uncoated, showing efficacy of Alox corrosion preventives.

The American Brass Co.
Waterbury, Conn.

Booth C-410

In attendance: T. B. Smith, E. B. Brown, C. E. Swift.
Exhibiting (in operation): Anaconda copper and copper alloy welding rods. Demonstration of both electric and oxyacetylene welding. Displays of alloys, such as the high strength engineering alloy Everdur Silicon-Copper, Avialite, the copper aluminum alloy used for valve seats, guides and spark plug bushings in aeroplane and other internal combustion engines and Anaconda Beryllium-Copper, the new high strength heat treatable copper-rich alloy. Displays of die pressed forgings, extruded shapes and pressure die castings as well as supernickel and phosphor bronze head plates.

American Car and Foundry Co.
New York

Booth C-431

In attendance: F. C. Cheston, sales agent; H. C. Cheston, sales agent; W. J. Bisset.
Exhibiting (in operation): No. 2 two-electrode rivet heater; No. 1 one-electrode horizontal type "C" heater; and the No. 3 two-electrode combination fully automatic and hand-feed heater.

American Chain & Cable Co., Inc.
Bridgeport, Conn.

Booth C-515

See Andrew C. Campbell Division and Page Steel and Wire Division.

The American Foundry Equipment Co.
Mishawaka, Ind.

Booth B-542

In attendance: Otto A. Pfaff, vice president and general manager; L. L. Andrus, general sales manager; A. E. Lenhard, advertising manager; A. Nicolini, service engineer.
Exhibiting (in operation): No. 1 Wheelabrator Multi-Tablast, an airless abrasive blasting machine, designed for cleaning flat, fragile or thin-section pieces such as castings, forgings, or stampings. The work is placed on a series of rotating tables mounted on a spider which moves the tables into the blasting chamber and through the path of the abrasive from the Wheelabrator unit. As the tables emerge, the work is turned over and readmitted to the abrasive blast for a cleaning of the underside. This machine is ventilated by an assembled type American "Dustube" dust collector which is on display.
Samples of work cleaned in the Wheelabrator are on display showing diversified range of metal cleaning problems.

American Gas Association
New York.

Booth, combined Industrial Gas Exhibit

In attendance: C. Foster Clark, Detroit City Gas Co., chairman of committee on displays at national industrial expositions; and Eugene D. Milener, New York, secretary of industrial gas section of A.G.A.; representatives of the following manufacturers of gas equipment used in the metal industries: American Gas Furnace Co.; Bellevue Industrial Furnace Co.; Chas. A. Homes, Inc.; Eclipse Fuel Engineering Co.; Surface Combustion Corp.; Partlow Corp.; Sterling-Detroit Corp.; Selar Co.; C. M. Kemp Mfg. Co.; Despatch Oven Co.; Industrial Heating Equipment Co.; Paul Moehler Co.; and Ensign Reynolds, Inc.
Exhibiting (in operation): Gas heat treating and melting equipment in cooperation with 13 manufacturing companies and the gas utility company members of the Association.

American Gas Furnace Co.
Elizabeth, N. J.

Booth D in the combined Industrial Gas exhibit

In attendance: P. C. Osterman, vice president; Elmer C. Cook, sales manager; George A. F. Machlet, John Mehrman, Theodore Farwick, Sr., Fred Schweizer, William J. Barenscheer, Gustav Schwab, Porter Hurd, S. P. Rockwell, W. A. Stumpf, Kenneth Stumpf, O. T. Muehlemeyer, S. C. Dinsmore, W. H. Kelsey, Ralph C. Schwarz, Oscar R. Olson, Arch V. Ritts.
Exhibiting (in operation): 1. The latest high speed oven furnaces with bottom vent and vent closures and atmosphere adjusting burners automatically actuated by the door mechanism. 2. A reciprocating full muffle continuous heating machine for clean hardening with whatever gaseous atmosphere may be desired. 3. An improved pot hardening furnace with latest type lining and insulation, numerous small burners for uniform heating and quiet operation distributed about the upper part of the furnace which is arranged with down draft. 4. A newly improved oven furnace which is especially adapted for use in the tool room. This fur-

nace is extremely versatile and lends itself readily for hardening, annealing, carburizing and tempering. 5. A burner type heating machine of high capacity which is especially adapted for localized hardening and annealing. 6. A number of small bench appliances of a new improved design which have just been placed on the market. These appliances consist of a forge, muffle furnace and a melter and pot furnace. 7. A display of many different types of blowpipes and special burners which may be used with city gas, natural gas, or bottled gas. 8. Photographs.

American Manganese Steel Division
Chicago Heights, Ill.

Booth C-251

In attendance: W. G. Hoffman, assistant general sales manager.

Exhibiting: Boxes, pots and other small furnace castings.

American Metal Market
New York.

Booth C-522

In attendance: S. P. Trench, vice president; R. A. Langer, secretary; S. Glassford, circulation manager.

Exhibiting (in operation: Specimen copies of the pioneer daily newspaper of the iron, steel and metal working industries. Established in 1882 as a weekly. Published daily since 1899, publishing daily market reports, prices and news developments affecting the iron, steel and metal fields. An effective advertising medium used by over one hundred important sellers of iron, steel, metals and alloys.

American Screw Co.
Providence, R. I.

Booth C-238

In attendance: Walter Gibbs and Arthur P. Widman, representatives Detroit territory.

Exhibiting (in operation): A demonstration of the many advantages of the American Plus Phillips Screws as compared to the many disadvantages of the conventional Slotted Head Screw.

Large white disc on the back panel containing eight translite photographs that light up consecutively, each illustrating some particular advantage of the screw such as faster driving, better holding power, reduced work spoilage, elimination of accidents, better appearance, etc. A Phillips hand screw driver with a Phillips screw held firmly on its point revolves around the disc pointing to each photograph as it lights up.

Demonstrating unit with a stop watch arrangement conclusively demonstrates the faster driving properties of the American Plus Phillips Products. At the Atlantic City show it definitely proved that Phillips could be driven in half the time of slotted screws.

American Steel & Wire Co.
Cleveland (United States Steel Corporation Subsidiary).

Booth B-121

Exhibiting: Wire and rods of all types; stainless and cold finished strip; detailed exposition of the austempering process and products so treated; demonstration of tests.

See also "United States Steel Corporation Subsidiaries."

Ampco Metal, Inc.
Milwaukee.

Booth C-425

In attendance: R. W. Uecker, secretary-treasurer; J. D. Zaiser, sales engineer; S. C. Lawson, sales engineer; R. J. Thompson, Michigan sales representative.

Exhibiting: Castings and fully machined parts of the various grades of Ampco Metal. Large exhibition of stainless steel parts formed and drawn over Ampco dies, together with samples of Ampco die rings used in that production. Samples and data pertaining to Ampco's service on guide bushings, wear strips, pickling equipment, welding dies, maintenance alloys, and safety tools.

Arcos Corp.
Philadelphia.

Booth A-542

In attendance: Arcos Corporation—R. D. Thomas, president; H. N. Ewertz, sales manager; K. W. Ostrom, assistant to superintendent; and R. E. Carriat, secretary. C. E. Phillips & Co.—C. E. Phillips, president; J. C. Menzies, vice president; W. J. White, salesman; G. B. Purcell, salesman; and G. H. Teichert, salesman.

Exhibiting: Stainless steel electrodes; heat resisting chromium-nickel electrodes; low chromium alloy electrodes; bronze electrodes; aluminum electrodes; nickel electrodes; manganese electrodes; cast iron electrodes; car-end electrodes; methods of testing alloy weld deposit; and equipment welded with Arcos electrodes.

Armstrong Cork Products
Lancaster, Pa.

Booth C-141

In attendance: F. M. Ritts, manager, high temperature insulation department; L. W. Bertelsen, high temperature insulation specialist; H. H. Gates, high temperature insulation specialist; S. M. Jenkins, high temperature insulation specialist; M. Stewart Ireys, advertising department.

Exhibiting (in operation): Armstrong's insulating fire brick for all types of heated equipment; Armstrong's insulating fire bricks Nos. N-16, N-20, A-25, EF-22, EF-26, for temperatures up to 1600, 2000, 2500, 2200, 2600 degrees Fahr. respectively; Armstrong's cements for laying and facing insulating fire brick; Armstrong's cements Nos. 1600, 2500, 2600; Armstrong's Air Set Cement, Armstrong's Facing Cement, and Armstrong's Monolithic Cement; Armstrong's Coprtex High Temperature Block and Coprtex Heat Insulating Cement.

Atlas Foundry Co.
Detroit.

Booth A-314

In attendance: Wm. B. Crawford, president; R. B. Crawford, vice president; and L. G. Korte, foundry engineer. Messrs. Denison, Beattie, Barten, Smalley and Reece of the Meehanite Metal Corporation.

Exhibiting: Sample castings of Meehanite Metal. Pictures and photomicrographs of Meehanite Metal.

Neither STERILIZATION nor DEEP DRAWING can DULL or DAMAGE this BRILLIANT BLACK FINISH

Jet-cote

FOR SPRAY, DIP OR ROLLER APPLICATION TO METAL

Jet-Cote is a bright black metal coating that stays black and brilliant through all the abusive processes of fabrication . . . including deep drawing and sterilization. It can be used directly on metal without sizing. Ask for details.

TOUGH JOB HEADQUARTERS

Rx Prescription Finishes

Give us your metal coating problem. We guarantee you an answer based on your conditions, and not just a standardized formula.

THE WATSON-STANDARD CO.

Manufacturers of

PAINTS . . . VARNISHES . . . INDUSTRIAL FINISHES AND LITHOGRAPH COATINGS

FACTORY AND GENERAL OFFICES: PITTSBURGH, PA.
WAREHOUSES: BOSTON · BUFFALO · DETROIT

Baldwin-Southwark Corp.
Eddystone, Pa.

Booth B-415

In attendance: F. G. Schranz, sales manager; F. G. Tatnal, C. H. Gibbons, R. G. Tabors, A. K. Nowak, F. Buckingham, salesmen; Graham Rohrer, advertising supervisor.
Exhibiting (in operation): A 6000 lb. Southwark Tate-Emery universal testing machine; a Southwark type 5-50 universal testing machine; a R. R. Moore fatigue testing machine; a Carpenter torsion impact testing machine; a 1000 lb. Bernhard oscillator; a Rayflex fatigue testing machine; a Morehouse proving ring; and various types of De Forest strain gages.

W. O. Barnes Co.
Detroit.

Booth C-524

In attendance: J. H. Flavell, president; A. Yorseck, vice president; C. B. Cecil, sales manager; J. W. Bennett, Wm. T. Johnston, C. D. Ambler, F. M. Shaw, A. G. Young, direct factory representatives.
Exhibiting (in operation): Barnes' genuine high speed Red Arrow anl Barnes' molybdenum alloy service blades on a Racine power hack saw machine. Animated electric sign showing the correct and incorrect way to use hand hack saw blades. Demonstration on an especially designed and built table of various types of hand hack saw blades.

Barrett-Cravens Co.
Chicago.

Booth C-113

In attendance: E. J. Heimer, vice president; H. E. Burt, central district manager; E. C. White, Detroit representative.
Exhibiting: Hand lift trucks; tin plate trucks; portable elevators, hand and electric operated. Nifty Lifter System material handling equipment.

The Bastian Blessing Co.
Chicago.

Booth A-105

In attendance: Ellsworth L. Mills, Harris A. Goodwin, R. Adam Johnstone, H. O. T. Ridlon, district sales managers; John C. Owen, sales department.
Exhibiting (in operation): Mass production welding of small parts. Display includes Rego gas manifolds, Rego welding and cutting apparatus, economizers, air regulators, cylinder valves, liquefied petroleum gas apparatus. Daily prize contest to the visitor who guesses the nearest to the number of parts welded each day.

Bausch & Lomb Optical Co.
Rochester, N. Y.

Booth A-537

In attendance: I. L. Nixon, manager of instrument sales; C. C. Nitchie, sales engineer; M. H. Stevens, assistant manager industrial sales; H. L. Shippy, Detroit sales representative; L. V. Foster, optical engineer; J. Wilson, metallurgical engineer; F. J. Loomis, sales engineer; and J. H. Mead, Chicago sales representative.
Exhibiting (in operation): Large research type metallographic equipment for bright field, dark field and polarized light; large standard metallographic equipment; routine metallographic equipment; new contour measuring projector; Ortho-Stereo camera and Ortho stereoscope; Petrographic microscope; Brinell microscopes; wide field binocular microscopes; spectrum measuring microscope; and dust counter.

Bethlehem Steel Co.
Bethlehem, Pa.

Booth B-131

In attendance: Members of sales department.
Exhibiting (in operation): 1. turret top, fenders and other deep drawn parts. Will feature views of the key operations in the continuous strip mill. Coils of 72 in. strip will be shown. 2. Mayari R high-tensile, low-alloy steel. Typical applications in the automotive field. 3. Model of 25 ton furnace for alloy steels. 4. Operating models of wire rope and stranding machines, supplemented by views of plant operations. 5. Bethanized wire, wire rope, strand, and other products. 6. Tool steels.

Binks Manufacturing Co.
Chicago.

Booth C-318

In attendance: J. F. Roche, president; J. F. Roche, Jr., S. Bramsen, vice presidents; E. F. Watts, advertising manager; A. W. Christenson, Detroit manager; F. G. Garreson, engineer; F. M. Johnson, W. F. Young, salesmen; Ralph DeGaynor, artist.
Exhibiting (in operation): Spray painting equipment for finishing all types of metals; water cooling towers used in the heat treating of metals.

Blakeslee & Co., G. S.
Cicero, Ill.

Booth C-250

In attendance: H. A. Sparrow, Detroit representative in charge; J. W. Dammers, treasurer; and M. A. Snell and A. S. Reichel, sales engineers.
Exhibiting (in operation): Solvent and degreasing machines and a Niagara metal parts washer, which cover the two most popular and up-to-date methods of metal cleaning. A new improved Model R degreaser equipped with the water separator in operation. A model degreaser made of glass operating to show the principles of the Blakeslee solvent degreasing process. Blakeslee Co. popular LLV or three tank solvent degreaser, having the economical Dual-Vapor-Control system. Photographs of the spiral quenching machine used in heat-treating departments.

Botfield Refractories Co.
Philadelphia.

Booth C-244

In attendance: A. H. Engstrom, vice president and sales manager; H. H. Hoisington, sales engineer; and S. C. Lott, sales engineer.
Exhibiting: We shall exhibit a complete line of high temperature cements, plastic fire brick, plastic chrome ore, insulating refractory brick, and high temperature insulating cement.

Braeburn Alloy Steel Corp.

Braeburn, Pa.

Booth D-307

In attendance: Thomas H. McGraw, Jr., president; and E. A. Brophy, Detroit district sales manager.

Exhibiting: Finished shear blades, special tools and dies, and various specimens of tool steel.

The Bristol Co.

Waterbury, Conn.

Booth B-407

In attendance: H. E. Beane, field sales manager; L. E. Mustard, Detroit district manager; G. H. Gaites, Pittsburgh district manager; H. Will, J. F. Inderdohnen, J. E. Young, H. R. Bristol, W. F. Emery, J. G. Kirkpatrick, sales engineers; C. R. DeArman, sales promotion department.

Exhibiting (in operation): Bristol's Pyromaster Potentiometer and applications in the metals industries. Air-operated and electric controllers in operation to demonstrate the value of these instruments in providing for extremely close temperature control in electric and fuel-fired furnaces and ovens. The simplified operating mechanisms under transparent covers.

A new electronic controller shown for the first time.

The control circuit of this instrument is completely electrical. It is extremely accurate and provides for long life of the vacuum tube and relay used.

Bristol's Ardometer Radiation Pyrometer and Bristol's Pyrotrol, for protecting gas-fired ovens against explosions. A low-range draft controller and an air-fuel ratio controller.

The Brown Instrument Co.

Division of Minneapolis-Honeywell Regulator Co., Philadelphia.

Booth B-508

In attendance: E. B. Evleth, vice president and general manager; L. Morton Morley, vice president and general sales manager; R. L. Goetzenberger, vice president; H. M. Schmitt and R. A. Weikel, Philadelphia; C. L. White, W. F. Arnoldy, H. P. Osgood, and W. R. Sokel, Detroit; W. R. Moore, R. H. Perry, C. W. Lugar, J. Maher, and J. P. Clark, Cleveland; G. E. Flower, Toledo; C. N. Sherwin, Detroit.

Exhibiting (in operation): Indicating, recording, controlling instruments and auxiliary equipment used in the production, fabrication and heat treatment of both ferrous and non-ferrous metals. These will include electrically and pneumatically operated thermometers for die-casting machines, ovens, tempering tanks and other services up to 1200° F.—also electrically and pneumatically operated control potentiometers for use with thermocouples or radiation pyrometers for hardening, brazing and annealing furnaces or other services up to 3400° F.

The following instruments are being exhibited: Brown Analy-Graph: Self-contained system for analyzing and measuring furnace atmospheres; The Brown Multiple-Recording and Controlling Potentiometer Pyrometer: the newly developed Brown Multiple-Recording Potentiometer Pyrometer, operating on the balanced Wheatstone bridge principle. Where it is desirable to record several temperatures on one chart, this instrument makes it possible to record and control from two to six temperatures from as many different thermocouples. The Brown Radiomatic Pyrometer: a new line of recently improved radiation pyrometers for measuring the temperature of open hearth roofs or temperatures inside of hydrogen brazing furnaces; the Brown Air-o-Line Potentiometer: For automatic temperature control of continuous furnaces as encountered in steel mill practice; the Brown Furnace Pressure Controller: maintains the pressure inside the furnace constant at a pre-determined value by means of automatically operated dampers that regulate the flow of gases from the furnace.

Buehler, Adolph I.

Chicago.

Booth C-234

In attendance: Adolph I. Buehler, owner; and A. W. Grashoff, representative.

Exhibiting (in operation): Demonstrating metallographic sample preparation equipment such as: A-B Specimen Cutter, A-B Grinding and Surfacing Machines, A-B Polishing Machines with inexpensive semi-automatic drive to hold and polish three specimens; new A-B Specimen Mount Press for transoptic or Bakelite molds; new accessory tools for marking and timing; A-B Micro Hardness Test Equipment, metal microscopes for surface inspection, measuring and grain size control, medium and large metallographs and Macro Cameras, all instruments for metallurgical production and research laboratories.

Andrew C. Campbell Division, American Chain & Cable Company, Inc.

Bridgeport, Conn.

Booth C-515

In attendance: R. J. Southwell, sales manager; H. G. Robinson, chief engineer; and Grant Casserly, salesman.

Exhibiting (in operation): Cut-Off Machines Nos. 213 and 302 as well as No. 401 Cutamatic. These machines cut materials such as alloy steels, non-ferrous alloys, plastics and many other materials.

The Carborundum Co.

Niagara Falls, N. Y.

Booth A-509

In attendance: S. F. Courter and F. J. Tone, Jr., sales managers; B. H. Work, A. H. Prey, and H. J. Wills, sales engineers; C. J. Steuber, Detroit district sales manager; C. H. Niekamp, P. R. Dumas, J. Storm, R. L. Place and J. H. Thomas, Detroit; J. C. Rice, J. E. Rice.

Exhibiting: A complete line of grinding wheels for both snagging and precision grinding, as well as tool room, cut-off, roll grinding, crank and cam shaft and diamond wheels. Abrasive paper and cloth will also be exhibited and polishing grain.

The Carborundum Co.

Refractory Division

Perth Amboy, N. J.

Booth A-509

In attendance: R. A. Beverley, Chicago sales

manager; S. A. Fenno, Cleveland sales manager; D. W. Polhemus, Cleveland sales representative; R. A. Barr, Perth Amboy sales promotion manager; C. E. Hawke, Perth Amboy general sales manager.
Exhibiting (in operation): Small electric furnace showing conductivity of various refractories. Also exhibit of refractories for various heat treating furnace applications.

Carnegie-Illinois Steel Corp.
Pittsburgh, (United States Steel Corporation Subsidiary).

Booth B-121

Exhibiting: Sample sections of high-tensile, corrosion-resistant Cor-Ten, Man-Ten, and stainless steels; sheets showing available grades and finishes; new data on hardenability, slag-control, and other metallurgical tests; movie, "Cor-Ten, Its Manufacture and Uses"; structural shapes, flats, rounds and bars, in carbon and alloy grades. See also "United States Steel Corporation Subsidiaries."

Carpenter Steel Co.
Reading, Pa.

Booth B-259

In attendance: F. R. Palmer, assistant to president; B. H. Delong, metallurgist; G. V. Luerssen, metallurgical department; W. Schlegel, metallurgical department; O. V. Greene, metallurgical department; P. Greenawald, metallurgical department; W. H. Kemper, metallurgical department; H. A. Baxter, district sales manager; J. B. Guthrie, district sales manager; C. A. Heil, district sales manager; E. E. Mueller, L. E. Cooney, C. W. Windfelder, J. L. Hall, R. I. Beeson, Leroy Owen, H. G. Roodhuyzen, V. G. Gardner, J. S. Bailey, F. C. Phillips, C. O. Ericke, H. A. Baker, S. J. Madden, and F. J. Ogborn, salesmen.
Exhibiting (in operation): Hardening furnaces will be installed in our booth for this purpose.
The new Carpenter Matched Tool Steels will respond accurately to heat treating methods that would not have been possible ten years ago—fast heating—positive quenching—absolute freedom from soft skin—and other advantages that make the hardening job easier and more certain. Unbalanced sections of water hardening tool steel such as the shape illustrated will be hardened as a part of this demonstration.
A method for controlling the atmosphere in a fuel fire furnace is demonstrated. Instruction will also be given on a method for "analyzing the furnace atmosphere by eye."

Chase Brass & Copper Co.
Waterbury, Conn.

Booth A-519

In attendance: Dr. D. K. Crampton, director of research; J. J. Vreeland, O. W. Harrington, Robert Lea, H. P. Croft, and Francis Gallo.
Exhibiting (in operation): Examples of welded and fabricated products of Chase brass, copper and bronze. Actual demonstrations of welding copper and Olympic bronze. All types of difficult welds—butt welds, fillet welds and lap welds—on copper, bronze and steel.
Among the fabricated parts being exhibited are Olympic bronze tanks and water heaters, welded copper bus tube assemblies, 12" welded Olympic bronze, fittings and fabricated pipe, copper headers, copper fin tubing, brass forgings, Olympic bronze evaporators, deep drawn shells, hot rolled angles and welding rods.
A working model of a newly designed sluice gate made of Chase Olympic bronze for sewerage work.

Chilton Co.
(Automotive Industries), Philadelphia.

Booth D-309

In attendance: C. A. Musselman, president; Joseph S. Hildreth, vice president and manager of Automotive Division; H. E. Boyd and E. E. Elder, representatives; Joseph Geschelin, Detroit technical editor; J. A. Laansma, editor of Motor World Wholesale; James Schermerhorn, Jr., representative.
Exhibiting: Automotive business publications.

Climax Molybdenum Co.
New York.

Booth C-432

In attendance: Max Schlott, president; J. B. Thorpe, W. P. Woodside, Alan Kissock, and C. M. Loeb, Jr., vice presidents; A. J. Herzig, chief metallurgist; V. A. Crosby, R. M. Parke, E. R. Young, P. M. Snyder, G. O. Loeffler, R. L. Wilson, J. D. Robb, H. L. Hostetter, T. D. Parker, J. E. Wilson, and T. W. Hardy, metallurgical engineers.
Exhibiting: Reception space only.

Columbia Steel Co.
San Francisco, (United States Steel Corporation Subsidiary)

Booth B-121

Exhibiting: Carbon and alloy steel flats, rounds, bars and shapes; Cor-Ten and Man-Ten steel applications, tests and demonstrations. See also "United States Steel Corporation Subsidiaries."

Continental Industrial Engineers, Inc.
Chicago.

Booth B-144

In attendance: W. A. Darrah, E. B. Jones, R. R. LaPelle, R. A. Hastings.
Exhibiting (in operation): Continental recirculating annealer; Continental heat treat machine; Continental muffleless gas carburizer (continuous).

Continental Machines, Inc.
Minneapolis, Minn.

Booth B-548.

In attendance: L. A. Wilkie, president; D. A. Moreinis, L. D. Kling, G. A. Isaacson and W. C. Conrad, representatives.
Exhibiting (in operation): Doall Metal Contour Cutting Saws and Continental Band Filing Machines.

Crown Rheostat & Supply Co.
Chicago.

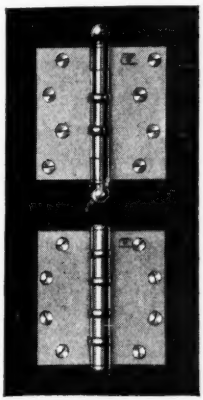
Booth B-307

In attendance: G. A. Spencer, president; G. E. Huenerfauth, vice-president; G. J. Yochim, salesman.
Exhibiting (in operation): New variable

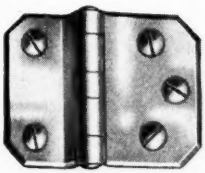
A METAL CLEANING PROBLEM AND ITS *Low Cost* ANSWER

ORTHOSIL*

TRADE MARK



A few examples of the most popular products in the Stanley line.



"Stanley" is a name that means fine hardware to millions of people. Products such as these must not only give years of service, but must retain their excellence of finish indoors or out. The Stanley Works have found that the metal cleaning operation prior to plating goes a long way to determine the durability and beauty of the finish.

How can cleaning best be handled, at lowest cost? Here is the experience of The Stanley Works: "We have found Orthosil particularly valuable in the cleaning and preparation of steel, iron, and cast iron goods for plating operations. We use a hot Orthosil solution with reverse current in our electrocleaner bath, followed by an acid dip and rinse. Cast iron, especially, responds to this type of treatment, and on some articles we have found it the most satisfactory method."

Orthosil, one of the Pennsalt Cleaner line, is used by leading manufacturers in all parts of the country. Almost without exception, it has materially reduced the cost of heavy duty metal cleaning. Why not check its advantages in your own plant? Write us for details — address Department H.

PENNSYLVANIA SALT MANUFACTURING COMPANY · Est. 1850

WIDENER BLDG., PHILADELPHIA, PA.

New York · Chicago · St. Louis · Pittsburgh · Tacoma · Wyandotte

*Particularly effective in electrolytic cleaning due to its high conductivity • Assures quicker action than other alkalis • Prevents grease and dirt from re-depositing • Easy to pour, quick to dissolve • Dry—highly concentrated—economical • Quickly removes the grease, soot, dust, and various other kinds of dirt unaffected by pickling acid • Leaves material clean for further processing.

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

speed polishing lathe; new type of work holding heads for polishing; plating barrel; drying unit; rheostat; line of polishing compositions.

A. P. de Sanno and Son, Inc.

Philadelphia.

Booth A-107

In attendance: J. C. Rinehart, sales manager grinding wheel division; Miles Sheehy and Warren Stafford, sales representatives; Arthur E. Petersen, V. Colajezzi, and B. G. Hardy, engineering department.

Exhibiting (in operation): Radiac Cut-Off Machine Type "K" cutting by the abrasive wheel method both wet and dry metals and other materials. Type "F" Radiac Bench Machine cutting various materials with an abrasive disc dry cutting. Type "C" Radiac Cut-Off Machine cutting various materials with an abrasive disc dry cutting. Display and demonstration of line of abrasive mounted points and stones used in connection with the small electric hand grinder and exhibit of small tool and cutter grinding wheels and abrasive cutting off discs.

Despatch Oven Co.

Minneapolis, Minn.

Booth Combined Industrial Gas Exhibit

In attendance: A. E. Grapp, president; H. L. Grapp, vice president; F. H. Faber, secretary and sales manager; A. L. Kershaw, G. A. Webb, A. W. Anderson, C. O. Anderson, C. E. Noble, E. H. Seelbach, L. R. Nourie, K. J. Papke, C. S. Gordon, A. G. Batsner, F. D. Rice, T. N. Holden, S. H. Baylor, and S. A. Silbermann, district engineers.

Exhibiting (in operation): One Despatch Pot Type Dense Load Furnace, gas heated, specially recommended to users because of its uniformity, speed, and operating economy. Temperatures up to 1250° F. One Despatch Horizontal Flow Batch Type Tool Room Furnace incorporating convected air heating, but with air traveling horizontally instead of vertically as is most generally used. The new design assures greater uniformity, better control, and speedy processing. Temperatures up to 1000° F.

Detroit Testing Machine Co.

Detroit.

Booth B-306

In attendance: Ralph Campbell and Fred H. Nass.

Exhibiting (in operation): Hardness testers; new direct reading Brinell machine; new special direct reading Brinell for tubes, pipes or other compressible members; ductility or sheet metal testers; Universal testing machines.

Harry W. Dietert Co.

Detroit.

Booth C-448

In attendance: Harry W. Dietert, president; Earl E. Woodliff, chief engineer; John A. Schuch, spectroscopist.

Exhibiting (in operation): A complete line of spectrographic equipment for qualitative and quantitative analysis of all metals, ores, and paints. Two minute carbon determinator and five minute sulphur determinator in operation analyzing carbon and sulphur content of various metals. Sand testing equipment for moisture, permeability and strength in operation.

The Dow Chemical Co.

Midland, Mich.

Booth C-115

In attendance: L. B. Grant, manager Dowmetal division; A. W. Winston, chief metallurgist; J. C. Mathes, W. R. Caple, G. C. Brown, and J. C. H. Stearns, sales representatives.

Exhibiting Various manufactured products in which Dowmetal is used either entirely or in part; a miscellaneous assortment of Dowmetal sand and die castings, extruded shapes, sheet and plate.

Driver-Harris Co.

New Jersey.

Booth B-251.

In attendance: F. V. Lindsey, vice president; W. E. Blythe, Detroit district manager; K. H. Hobbie, Chicago district manager; J. B. Shelby, foundry engineer; J. Sammon, foundry engineer; A. J. Eckley, sales department, Detroit; E. A. Terwell, sales department, Chicago; H. M. Thornquist, sales department, Chicago; L. V. Prior, sales department, Cleveland; and R. Beatty, sales department, Cleveland.

Exhibiting: The following types of castings are exhibited:

Roller Rail and Roller—The roller turns on a small shaft instead of on the trunnions, thus preventing dirt or scale from getting on the wearing surfaces and at all times allowing greater freedom for rotation. With no increase in weight or size this design will support about twice the load of the trunnion design. Patent has been applied for.

"Cantilever" Tray—A radical departure from the conventional tray design and has already proven its economy and durability in a number of the more severe atmosphere furnace applications.

Work Support Fixture—A unique type of fixture for use in supporting work in "Vertical" furnaces. Its flexibility permits the loading or stacking of work that is not possible with the usual type of fixture.

Malleableizing Basket—A complete new design comprising tray, liner sides, ends, etc., that permits assembly and dis-assembly with little effort.

Heat and Corrosion Resisting Alloys—"Nichrome", "Chromax" and "Cimet."

E. I. du Pont de Nemours & Co., Inc.

Wilmington, Del.

Booth A-501

In attendance: The R. & H. Chemicals Dept., Metal Treatment Division: R. M. Simington, manager; Dr. D. A. Holt, and W. M. Gager, metallurgists; C. A. Vincent-Daviss; Electroplating Chemicals Division: J. C. Pickard, manager; C. M. Hoff, assistant manager; F. F. Oplinger, H. H. Blouch, H. W. Kennedy, W. Bayer, E. Schweikher, H. L. Benner and E. C. Friedl.

Exhibiting (in operation): Chemicals for heat treating steels, and other chemicals and processes for modern metal finishing. An electroplating unit demonstrating new process recently developed.

Eclipse Fuel Engineering Co.

Rockford, Ill.

Booth: combined Ind. Gas Exhibit.

In attendance: G. W. McKee, vice president; Kurt A. Scharbau, general manager; D. A. Campbell, L. J. Strohmeyer, Elmer Boch, A. E. Englehart, E. E. Magnuson, and F. F. Marlowe, sales engineers; E. A. Stoner, shop superintendent; H. A. Harrison, Detroit representative; C. H. Martin, Chicago representative; W. H. Kay, Cleveland representative; E. H. Seelbach, Buffalo representative.

Exhibiting (in operation): Eclipse gas fired Rotair air draw furnace; Eclipse gas fired oven furnace; Eclipse gas fired pot furnace; Eclipse gas fired high speed steel furnace; McKee tunnel burners; McKee pressure blowers; McKee cycle lighter; Mckee automatic air-gas proportioning equipment; McKee automatic air control valves; McKee boiler and oven firing systems.

The Electric Furnace Co.

Salem, O.

Booth B-405.

In attendance: R. F. Benzinger, president; F. T. Cope, general manager; A. H. Vaughan, chief engineer; C. L. West, vice president; K. U. Wirtz, C. H. Vaughan, and N. H. Knowlton, sales engineers; G. P. Lozier, superintendent; S. J. Eberwein, assistant superintendent; B. C. Thompson, Detroit district representative; A. E. Wright, advertising manager.

Exhibiting: Photographs of recent furnace installations and latest developments in special atmosphere equipment for copper brazing, scale-free heat treating and bright annealing ferrous and non-ferrous products including wire, sheet., tubing, strip, stampings, bolts, automotive parts, etc., also samples of material treated in these furnaces.

Exhibit also includes photographs of outstanding electric, oil and gas fired furnaces built for normalizing, carburizing, short cycle malleableizing, nitriding, forging, annealing and other heat treating processes, also pictures of gas fired radiant tube furnaces, Elfurno special atmosphere generators, etc.

The Electro-Alloys Co.

Elyria, O.

Booth A-411

In attendance: W. J. Hansen, representative New York state; F. K. Ziegler, representative (western); A. M. Miller, Jr., representative Michigan; Harrison I. Dixon, Ohio representative; J. W. Henry, superintendent; C. E. Christi, production manager; L. B. Haughwout, Robert Denman, radiographers; W. C. Whyte, president.

Exhibiting: Heat and corrosion resistant castings such as muffles, retorts, molten liquid containers, carburizing boxes, furnace parts, and the inspection methods employed.

Electronic Control Corp.

Detroit.

Booth D-316

In attendance: F. D. Bentley and L. A. Rovelsky, sales engineers; H. T. Lathrop, and R. A. Powers.

Exhibiting (in operation): A model clearing press with curtain of light safety control; modern and approved curtain of light projector and receiver; radically new type of temperature control; and other varying Electronic equipment for inspection, grading and sorting.

A. Finkl & Sons Co.

Chicago.

Booth B-416

In attendance: E. H. Graham, Detroit district sales manager; W. L. Graham, Detroit district sales representative; Wm. F. Finkl, president, Chicago; James Moffatt, Chicago office sales representative; T. A. Ledin, and Alfred Finkl, metallurgists, Chicago; J. C. Vance, sales manager, Chicago; A. R. Lane, general manager, Chicago; J. M. Curley, Cambridge, Mass., district sales manager; Herman Berg, Cambridge Mass., sales representative; W. H. Rieger, Pittsburgh sales representative; J. H. Wilson, Cincinnati sales representative.

Exhibiting: Photographs of plant operations and products.

Exhibit of newly developed type of tempered die block.

Firth-Sterling Steel Co.

McKeesport, Penna.

Booth A-217

In attendance: D. G. Clark, vice president; R. T. Riffle, advertising manager; M. F. Judkins, chief engineer; F. H. Becker, Firthite engineer; H. W. Elias, Firthaloy engineer; A. B. Corbin, sales manager; O. K. Parmiter, chief metallurgical engineer; A. R. Zapp, Firthaloy manager; G. A. Jacobs, Detroit manager; and G. W. Frick, Cleveland manager.

Exhibiting (in operation): The display includes all types of Firth-Sterling Stainless steels, Globe Drill rods and wire. Firth-Sterling tool steels, die steels. Many types of Firthite Cutting Tools, and many non-standard Firthite tools of very recent design. Several types of Firthaloy wire drawing dies, tube drawing dies, etc. As well as all types of wear resisting parts.

The Fitzsimons Co.

Youngstown, Ohio.

Booth B-446

See Monarch Steel Co.

The J. B. Ford Sales Co.

Wyandotte, Mich.

Booth C-309

In attendance: B. N. Goodell, manager industrial department; W. M. Cole, assistant manager industrial department; C. R. Beaubien and C. L. Southwick, industrial representatives, Detroit.

Exhibiting: Complete display of Wyandotte specialized metal cleaners for plating, lacquering, enameling, japaning, and vitreous enameling. For use in still solutions, electric cleaning solutions, metal parts, washing machines, tumbling barrels, and spray gun equipment. For cleaning before bonderizing, chromodizing, parkerizing, anodizing, hot tinning, galvanizing, and assembling. For removing lacquer, japan, carbonized mineral oils, and fabricating compounds. Wyandotte burnishing compounds for all burnishing problems. Wyandotte

neutralizers ..for ..neutralizing ..acid ..after pickling operations. Wyandotte specialized cleaners for cleaning railway equipment, aeroplane, and automotive equipment.

General Alloys Co.

Boston.

Booth B-204

In attendance: H. H. Harris, president; G. C. McCormick, vice president; N. L. Smith, assistant to president; W. R. Blair, engineer; A. L. Grinnell, Detroit representative; J. J. Donovan, Chicago sales representative; J. R. Heckman, Chicago district sales manager; H. G. Chase, Ohio district manager; Geo. O. Desautels, Indianapolis representative; Hal W. Reynolds, Cleveland representative; A. H. Valentine, Dayton representative; Randolph Wohltman, St. Louis representative; Ralph Hare, New England representative; A. E. Painter, New York representative; Robert E. Chew, vice president Ladd Equipment Co., Pittsburgh representative.

Exhibiting: Nickel-chromium alloys, Q-Alloys; carburizing and annealing containers; cyanide and lead pots, furnace hearths, roller rails, heat and acid resistant chain; cyanide dipping baskets, recuperators, miscellaneous furnace parts, parts for every type heat treating furnace-carburizing, annealing, normalizing, hardening, tempering, forging, spheroidizing, tubes and retorts, corrosion and abrasion resistant castings.

General Electric Co.

Schenectady, N. Y.

Booth A-109

In attendance: L. D. Meeker, manager welding sales; B. C. Tracey, commercial welding engineer; H. P. Doud, W. M. B. Brady, E. Vom Steeg, H. O. Westendarp, and David Cramb, welding specialists; C. L. Ipsen, manager industrial heating sales; H. M. Webber, and R. M. Cherry, commercial engineers industrial heating; E. W. Cunningham, H. E. Scarbrough, F. H. Hill, and R. F. Newell, industrial heating specialists.

Exhibiting (in operation): AC and DC welders including several sets of brand new design. Complete line of welding accessories. Comprehensive exhibit of industrial products manufactured through the use of copper brazing, bright annealing, and scale-free hardening—all performed in G-E electric furnaces. A dramatic exposition of the facts about electric heat for industry.

General Electric X-Ray Corp.

Chicago.

Booth A-109

In attendance: E. W. Page, manager, industrial department; R. F. Holste, engineer; R. Landis, engineer; E. H. Reynolds, engineer; Paul Freer, industrial department; G. E. Simons, manager, sales promotion department. The following from the Detroit office: H. I. Nelson, manager; C. S. Bierwagen, salesman; C. E. Moore, salesman; L. B. Whelan, salesman; T. T. Magnuson, serviceman; F. L. Hoffman, serviceman; George Williams, and D. V. Murker.

Exhibiting: The latest oil-immersed, shockproof industrial X-ray machine with appropriate radiographs.

Globar Division, The Carborundum Co.

Niagara Falls, N. Y.

Booth A-509

In attendance: B. A. Bovee, chief engineer; N. H. Berry, and W. S. Evans, engineers; K. E. Rogers, sales manager.

Exhibiting (in operation): A small Globar equipped furnace.

Claud S. Gordon Co.

Chicago.

Booth B-306

In attendance: C. S. Gordon, president; C. O. Anderson, and A. W. Anderson, vice presidents; S. A. Silbermann, district manager.

Exhibiting (in operation): Lead wire; thermocouple wire; insulators; thermocouple assemblies; protection tubes; switches, cinch steel cement; chart paper.

Handy & Harman

New York.

Booth A-525

In attendance: T. H. Gallagher, Chicago office (sales); A. W. Swift, Chicago office (sales); Fred Petrie, Bridgeport plant (laboratory); H. A. Folgner, New York office (sales); Leo Edelson, New York office (sales); and F. T. Van Syckel, New York office (sales) (in charge).

Exhibiting (in operation): Features low temperature brazing. The main attraction is a high pressure steam boiler used by the New York Central Railroad for heat and hot water on their electrified trains. In this boiler 1,237 copper tubes are joined to steel headers by the low temperature brazing alloy Easy-Flo—2,474 joints in all. A series of slides will show the brazing process. Many other samples of work done with Sil-Fos, Easy-Flo and Handy Flux will be displayed. Actual demonstrations of joining ferrous and nonferrous metals with these alloys will be carried on continuously. Silver clad plate and powdered metals containing silver will also be shown.

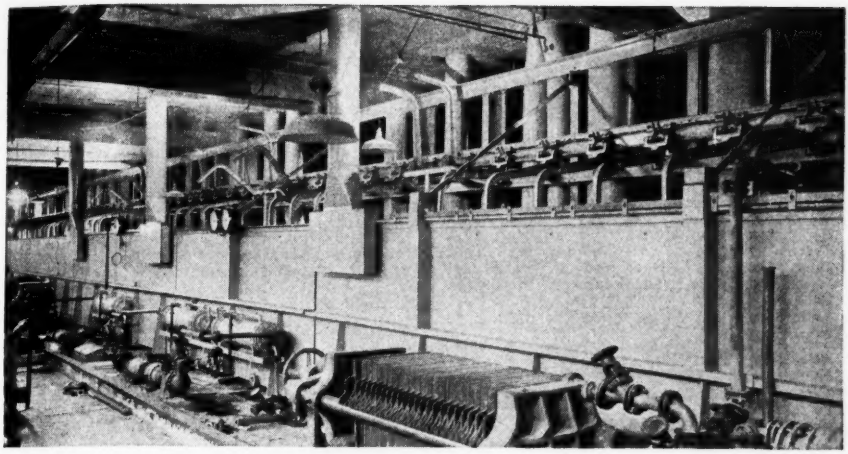
C. I. Hayes, Inc.

Providence, Rhode Island.

Booth A-508

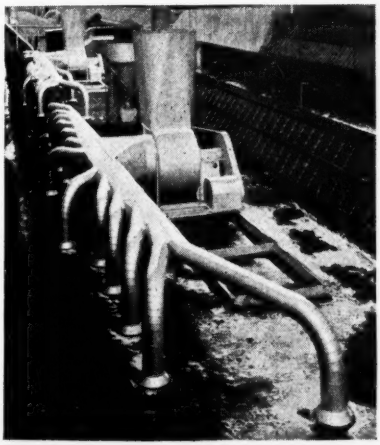
In attendance: C. I. Hayes, president; J. E. Hines, vice president and sales manager; W. R. Gilbert, chief engineer; C. G. Paulson, sales engineer, K. W. Pettigrew, service engineer; C. A. Hooker, Detroit district manager; E. F. Burke, Cleveland district manager; J. E. Figner, Pittsburgh district manager; and R. G. Hess, New York district manager.

Exhibiting (in operation): Furnaces, "Certain Curtain" type, with atmosphere control for heat treatment of high speed, carbon, alloy, and high carbon, high chrome tool steels. Furnaces are in operation, and visitors are invited to bring in sample tools or specimens for demonstration hardening. A photographic exhibit showing equipment and installation for a wide range of heat treating operations, including copper brazing, bright annealing, and conveyor hardening, many of which are equipped with attachments for control of furnace atmosphere.



KIRK & BLUM SYSTEMS

Illustrated above is a large Kirk & Blum installation on a Stevens automatic cleaning and pickling machine in the plant of a leading manufacturer of electric refrigerators. The suction piping connections and header, exhaust fans and discharge stacks on factory roof are shown below.



protect Men and Machines

FUMES and vapors from metal parts cleaning, pickling and plating operations are injurious to men and machines. Kirk & Blum Fume Exhaust Systems are designed and built to remove these fumes with utmost efficiency and economy. That is why they are extensively used in plating shops of all sizes as well as in plating departments of many leading manufacturing plants.

If you have a fume removal, dust collecting, pickling or plating problem, K & B Engineers will make a thorough survey of your plant and submit recommendations to solve it to your complete satisfaction. Write for details of this service—Send for interesting, illustrated Book "Dust Collecting Systems in Metal Industries."

Heppenstall Co.

Pittsburgh.

Booth C-426

In attendance: H. O. Lang, vice president, Heppenstall Company, Detroit, Mich.; J. C. Patton, district representative, Heppenstall Company, Detroit, Mich.; R. B. Heppenstall, vice president and general sales manager, Heppenstall Company, Pittsburgh, Pa.; S. B. Heppenstall, Jr., assistant sales manager, Heppenstall Company, Pittsburgh, Pa.; J. A. Succop, chief of research, Heppenstall Company, Pittsburgh, Pa.; and D. A. Stuart, salesman, Heppenstall Company, Pittsburgh, Pa.

Exhibiting: Models of automatic lifting devices.

Hevi Duty Electric Co.

Milwaukee.

Booth C-446

In attendance: E. L. Smalley, president; H. E. Koch, vice president; Arthur H. Oberndorfer, advertising manager; James Ayling, Cleveland district manager; Geo. A. Chuttle, New York district manager; Melville, Lowe, metallurgist.

Exhibiting: Bulletins, charts, specimens.

Hobart Brother Co.

Troy, O.

Booth C-208

In attendance: Roy Smith, district sales manager; E. A. Hobart, president; W. H. Hobart, vice president; O. H. Menke, factory manager; W. J. Chaffee, welder sales manager; E. K. Butterfield, welder sales; R. C. Bercaw, welding demonstrator.

Exhibiting (in operation): Demonstrating arc welding equipment. A complete line of the new Hobart "Multi-Range" arc welders with continuous demonstrations of such features as "1,000 volt-ampere combinations," remote control, "Motor Horsepower Control," etc. Samples of typical welded joints and other welding applications involving various kinds of ferrous and nonferrous metals.

Visitors are invited to actually use this revolutionary new welding machine. Equipment on display includes models powered by electric motors and gasoline engines as well as generators only for use with customers' own power units.

Charles A. Hones, Inc.

Baldwin, N. Y.

Booth, Combined Ind. Gas Exhibit

In attendance: Charles A. Hones, president; William R. Hones, vice president; Charles J. Hones, secretary; William F. De Voe, sales representative; A. A. Treadway, Detroit representative.

Exhibiting (in operation): Atmospheric pot furnaces, oven furnace, immersion heated tank, melting furnace industrial burners.

E. F. Houghton & Co.

Philadelphia.

Booth C-221

In attendance: G. W. Pressell, executive vice president; C. G. Schultze, assistant general sales manager; L. D. Holland, manager of marketing research; H. E. Martin, Detroit divisional sales manager; J. McElgin, metallurgist; D. J. Richards, Pittsburgh divisional sales manager; H. E. Sanson, Eastern divisional sales manager; D. C. Miner, advertising manager.

Exhibiting (in operation): Heat treatment salt baths; Houghton's Perliton liquid carburizer which is now in production throughout the metal working plants of the world. An Ajax electric furnace with various carburizing steels being heat treated and specimens available for examination.

Enlarged photomicrographs showing case structures obtained with Perliton. Samples of production work Perlitonized in various plants, as well as samples of drawing, cutting, etc., with the aid of Houghton metal working products.

Illinois Testing Laboratories, Inc.

Chicago.

Booth B-143

In attendance: J. A. Obermaier, president; M. D. Pugh, sales manager; C. A. Hooker, Detroit representative; E. F. Burke, Cleveland representative; D. L. Humm, Chicago representative.

Exhibiting (in operation): "Alnor" portable and wall type indicating pyrometers and resistance type thermometers, "Alnor" electronic type temperature controller, instantaneous, direct reading air velocity meter, "Alnor" forewarn metal detector for industrial applications.

Industrial Heating Equipment Co.

Detroit.

Booth Combined Gas Exhibit

In attendance: Charles E. Buysse, president; E. O. Hinz, sales; John Taylor, engineer; Don C. Jackson, engineer; and George B. Emerson, engineer.

Exhibiting (in operation): 1—"Circ-Air" Draw Furnace, continuous type. Capacity up to 1,000 pounds per hour at temperatures from 275 degrees Fahr. to 1,250 degrees Fahr.

This furnace can be used for drawing and coloring steel, for strain relieving between draws, heating aluminum for forging and heat treating, annealing and coloring brass and automatic soldering.

Industrial Heating Publication

Pittsburgh.

Booth B-318

In attendance: I. Stanley Wishoski, editor.

Exhibiting: "Industrial Heating"—a monthly publication that specializes on furnaces, ovens, kilns and all industrial heating processes used in the manufacture, finishing, processing and heat treatment of metals and other products.

The Industrial Press

New York.

Booth A-446

In attendance: DeWitt Lewis, field manager; Erik Oberg, editor; W. K. Hammond, and G. G. Turner, advertising representatives.

Exhibiting: Technical books, trade papers.

The Industrial Publishing Co.

Cleveland.

Booth B-310

In attendance: I. B. Hexter, president; L. P. Aurbach, vice president.

Exhibiting: Distributing and merchandis-

ing methods in the welding industry, and the increasing use of the method in all industries

International Nickel Co., Inc.

New York.

Booth C-226

In attendance: Members of development and research division; nickel sales department, and monel and rolled nickel department.

Exhibiting: Twenty-five nickel containing alloys ranging from ½ to 99.95% nickel.

The Iron Age

New York.

Booth B-113

In attendance: F. J. Frank, president; J. H. Van Deventer, editor; C. S. Baur, general advertising manager; Emerson Findley, Cleveland representative; B. L. Herman, Philadelphia representative; H. K. Hottenstein, Chicago representative; Peirce Lewis, Detroit representative; C. H. Ober, New York representative; W. B. Robinson, Pittsburgh representative; D. C. Warren, New England representative; T. L. Lippert, metallurgical editor; T. C. Campbell, Pittsburgh editor; W. F. Sherman, Detroit editor; D. R. James, Cleveland editor.

Exhibiting: Current copies of The Iron Age.

Jessop Steel Co.

Washington, Pa.

Booth C-441

In attendance: R. E. Emery, president; F. T. H. Youngman, vice president and treasurer; T. S. Fitch, manager composite steel division (in charge); D. J. Hanna, manager Detroit office; W. A. Jones, Detroit sales office; M. O'Hearn, Detroit warehouse; Geo. Ryan, operator, headquarters, Washington, Pa.

Exhibiting (in operation): Individual showcase demonstrating the evolution of:—(a) composite knife stock and finished blade (b) a high speed steel hacksaw and (c) a stainless steel knife. A fourth showcase containing miniature reproductions of Jessop products. A diorama is incorporated into the back panel which pictures the Jessop mill at Washington, Pa. Moving pictures of mill operations and of a general character. Jessop steels in use are indicated by a large 26-page book (page size—18"x26"). In addition there is a series of specially-mounted composite photographs showing the relationship of finished articles to the steel in process.

Special stress is given to Jessop Silverbond Composite Stainless Steels. Various tests such as reverse bend tests, twist tests, fracture tests, tensile tests are at hand to indicate the strength of the welded condition; also samples of the various finishes and forms. Your attention is invited to the photomicrograph (composed of 60 separate photographs) of two pieces of Silverbond Clad Stainless Steel fusion-welded together.

The J. W. Kelley Co.

Cleveland.

Booth C-507

In attendance: J. W. Kelley, A. F. Ruffner, B. Platell, V. Kennedy.

Exhibiting (in operation): Industrial oils; heat treating products; working display of KelKut transparent grinding oil.

Jones & Laughlin Steel Corp.

Pittsburgh.

Booth A-231

In attendance: From Pittsburgh — J. D. Allen, manager of sales, cold finished steel; C. F. Goldcamp, manager of sales, cold finished steel; A. A. Wagner, manager of sales, hot rolled steel; Wm. Miller, manager of sales, strip & sheet products; A. W. Herron, Jr., manager of sales, wire products; J. E. Timberlake, manager of sales, wire products; A. E. Crockett, special representative; M. W. St. John, manager of sales, coke by-products; H. W. Graham, general metallurgist; C. C. Henning, H. K. Work, Y. J. Bruce, W. P. Getty, F. A. Weymouth, A. M. Reeder, F. A. Weymouth, A. M. Reeder, L. T. Willison, J. E. Beck and C. F. Allison, all from the metallurgical department.

From Detroit—W. J. Bothwell, district sales manager; C. H. Joslin, F. M. Harbison, Jr., R. G. Carney, E. K. Waldschmidt, C. B. Buker, J. E. Morris, W. S. Fischley, J. W. Robinson, K. C. Batchelor, W. E. Danz, W. Heidgerd, L. C. Berkey, A. W. Jackson, C. M. Merritt, Miss V. Wood, H. R. Cowan, L. S. Roehm, warehouse manager; W. B. Michaelsen, assistant warehouse manager; F. J. Kaiser, G. J. Hanink, L. G. Wittman, H. Schippert, C. J. McKellar, V. J. Savage, G. F. Bliss, J. A. Upstill, D. H. Gordon, Paul Ewing, R. W. Burton, H. M. Edgar, L. G. McGillicuddy, A. W. Hammer, and Roy Atkinson.

Exhibiting (in operation): A working diorama of a steel mill is being displayed by Jones & Laughlin. Also typical samples and parts illustrating the many uses of carbon steel products, including J & L Strip and Sheets. Cold Finished Bars; Shapes, Shafting and Flats, Hot Rolled Bars, Shapes and Junior Structural Sections, Forging Steel, Spring Wire and Merchant Wire, Galvanized Sheet and many other products.

Notable among the special displays is a first showing of large forgings produced by Jones & Laughlin.

Visitors to the exposition will find special interest in the new high-speed motion picture of machining free-cutting steel. This motion picture, taken at the extreme speed of 800 frames per second, gives a highly magnified view of the cutting tool during the machining operation.

C. M. Kemp Mfg. Co.

Baltimore, Maryland.

Booth Combined Industrial Gas Exhibit

In attendance: E. B. Dunkak, vice president; William Hunt, development engineer; W. S. Bassett, Chicago district representative; and J. P. Flippen, Pittsburgh district representative.

Exhibiting (in operation): First showing of the Kemp C. A. Monitor for automatically controlling bright annealing gas generators to give constant gas analyses regardless of fuel and air supply variation.

Kemp immersion heated melting unit for the heating of soft metals with immersed gas flames.

Krembs & Co.
Chicago.
Booth C-520
In attendance: Ottmar M. Krembs, president; C. P. Feebusch, engineer; R. J. Frank, manager; and W. R. Krembs, advertising manager.
Exhibiting (in operation): A metal table and some gas, both oxygen and liquefied petroleum and some welding equipment so as to make demonstrations of brazing, welding and soldering.

Krouse Testing Machine Co.
Columbus, Ohio.
Booth C-407
In attendance: G. N. Krouse, president; J. P. Krouse, engineer.
Exhibiting (in operation): Repeated stress testing machines of the following types: High speed, rotating beam, rod and wire, sheet and plate.

Latrobe Electric Steel Co.
Detroit.
Booth C-510
In attendance: Marcus W. Saxman, Jr., secretary; Arthur M. Morgan, district manager; George D. Wilson, Fred H. Dickson, Kenneth A. Stroble, Ralph H. Bailey, and Joe E. Workman, salesmen.
Exhibiting: Reception.

Lava Crucible Co. of Pittsburgh
Pittsburgh.
Booth C-206
In attendance: Furman South, Jr., president; Harold E. White, vice president; Daniel E. MacLean, sales manager; C. H. Knappenberger, Michigan representative.
Exhibiting: Variety of standard and special shapes in super-refractories made of silicon-carbide, mullite, fused alumina, zirconia. Also plastic ramming mixes and cements. Shapes consist of brick, tile, burner, blocks, trough tile, hearth tile, cupola slag hole blocks, muffles. Small and massive shapes furnished to order.

E. Leitz, Inc.
New York.
Booth C-528
In attendance: H. W. Zieler, president; O. F. Soetbeer, secretary; P. R. Mayo; W. H. Kessel, and F. P. Mulgannon, district managers.
Exhibiting (in operation): Large Micro-Metallograph MM-1, latest model, for observation in ordinary incident light, polarized incident light, and dark field. Simplified Micro-Metallograph MM-2, with combination illumination unit arc lamp—incandescent light source. Universal Metallurgical Microscope "Panphot" of most recent design. Dilatometer, automatic magnetic polishing machines, low power stereo binocular microscopes, and various types of microscopical accessories, for metallurgical investigation. Leica Camera and accessories.

The Lincoln Electric Co.
Cleveland.
Booth A-532
In attendance: J. F. Lincoln, president and general manager; C. M. Taylor, vice president and sales manager; A. F. Davis, vice president and secretary; F. M. Malchle, manager Detroit office; R. D. Layman, manager Grand Rapids office; G. E. Tenney, manager Chicago office; J. W. Sugars, manager Toledo office; J. F. Cunningham, F. E. Boucher, H. Oldenkamp, M. S. Schonvizner, and R. Dalzell, sales engineers; V. Peters, welding technician.
Exhibiting (in operation): Lincoln shield arc welders, electrodes, automatic, supplies, Lincoln Linc-Weld motors; Linconditioner.

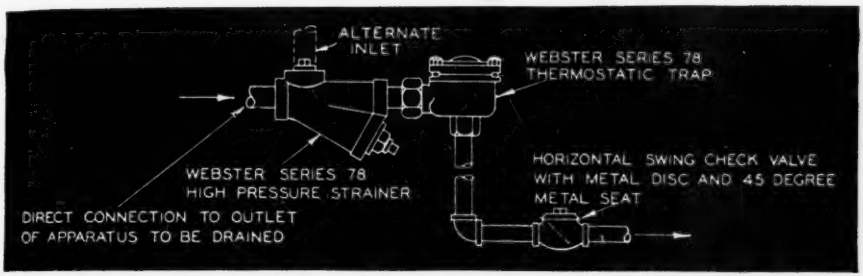
Lindberg Engineering Co.
Chicago.
Booth B-250
In attendance: A. N. Lindberg, president; L. A. Lindberg, secretary; C. H. Stevenson, vice president; F. A. Hansen, vice president; L. H. Remiker, chief engineer; L. C. Koenig, superintendent; L. A. Shea, assistant sales manager; C. F. Burling, service engineer; F. J. Condit, Detroit district manager; L. W. Hayden, New York district manager; C. P. Critzer, J. A. Ayling, Cleveland representatives; G. S. McFarland, Columbus representative; H. O. Munn, Buffalo sales representative; and R. C. Onan, advertising manager.
Exhibiting (in operation): Cyclone tempering furnaces; Tubulaire Electric furnaces; Lindberg controls; Lindberg throttling control; and Hydryzing process for hardening metals (new development).

Macklin Co.
Jackson, Mich.
Booth A-415
In attendance: T. T. McIntyre, president; B. F. McIntyre, vice president; N. H. Balz, district sales manager; C. C. McParlan, and Wm. Scholes, salesmen.
Exhibiting: Back wall, side wall, miniature swing frame grinder operating display of grinding wheels.

Magnaflux Corp.
Chicago.
Booth C-109
In attendance: A. V. deForest, president; F. B. Doane, vice president and treasurer; C. A. McCune, secretary; ;and C. E. Betz, technical director.
Exhibiting (in operation): Magnaflux Method of Inspection, which is a non-destructive and rapid method for determining defects in steel and steel parts, demonstrated on the latest designed Magnaflux units as employed in the automotive, aircraft, railroad and welding industries as well as in all general industrial fields. Various specimens from all of these industries are exhibited.

Magnetic Analysis Corp.
Long Island City, N. Y.
Booth A-213
In attendance: Wm. S. Gould, Jr., vice president and treasurer; Frank O. Fischer, engineer in charge of sales and service; John D. Wilfong, Jr., assistant engineer in charge of sales and service.
Exhibiting (in operation): One magnetic analysis 3" dual method equipment.

Quicker Heating-Up and Better Production with this Hook-up on Steam-Using Apparatus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HORIZONTAL SWING CHECK VALVE WITH METAL DISC AND 45 DEGREE METAL SEAT

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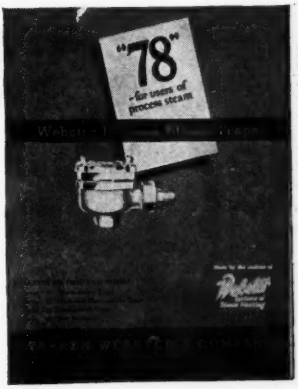


Mahr Manufacturing Co.
Div. of Diamond Iron Works, Inc., Minneapolis.

Booth B-535

In attendance: W. G. Barstow, vice president; C. F. Olmstead, chief engineer; C. W. Rudolph, Chicago district manager; A. F. Tenney, Dayton district manager; W. A. Otwell, Detroit district manager; R. M. Hortvet, project engineer; and A. J. Nordenson, sales engineer.

Exhibiting (in operation): Introducing the Mahr Nitrogen Generator. A standard 100 cu. ft. per hour unit in full operation with auxiliary gas analyzing equipment, demonstrating the uniformity and purity of the generated gas.

Also complete descriptive material on Mahr industrial furnaces, burners and auxiliary heating equipment.

P. R. Mallory & Co., Inc.
Indianapolis, Ind.

Booth A-437

In attendance: P. R. Mallory, president; J. A. Weiger, vice president and sales manager; J. D. Tebben, sales manager Detroit office; L. E. Arnold, assistant sales manager Detroit office; F. R. Hensel, consulting engineer; P. N. Cook, advertising manager.

Exhibiting: Complete showing of all types of Mallory electrodes—spot welding tips, seam welding tips, projection welding plugs, butt and flash welding dies—and water-cooled holders. Photographic display of diverse welding operations in automotive industries with performance stories of Mallory electrodes. Samples of many similar and dissimilar metals showing spot welding results obtained. Castings, forgings and finished machined parts of Mallory non-ferrous alloys of high electrical conductivity and great strength. Special displays of Mallory electrical contacts—tungsten, silver, Elkonite and special alloys—and types of apparatus using them. Displays of special parts fabricated by Mallory of tungsten and molybdenum.

The McKay Co.
Pittsburgh.

Booth C-548

In attendance: F. A. Bond, and J. C. McKay, vice presidents; C. E. Briner, purchasing agent; D. Helm, J. Harris, and L. E. Faulkner, production; F. Lewis, plant manager; J. Senft, plant superintendent; T. J. McKay, Jr., assistant plant manager; M. J. Van Dreser, and R. Fairlamb, sales department.

Exhibiting: Arc welding electrodes; shielded electrodes for automatic arc welding; industrial chain.

Metal Industry Publishing Co.
New York.

Booth C-318

In attendance: T. A. Trumbour, business manager; J. I. Wiarda, advertising manager; P. H. Langdon, assistant editor; E. E. Krack, Detroit representative; M. H. Garber, western manager.

Exhibiting: Specimen copies of Metal Industry, Casting Manual and Platers' Guidebook.

Metal & Thermit Corp.
New York.

Booth B-502

In attendance: John B. Tinnon, sales manager; R. L. Browne, New England branch manager; C. D. Young, Chicago branch manager; H. T. Thompson, Pittsburgh branch manager; J. H. Deppeler, chief engineer; M. L. Smith, advertising manager; J. C. Honhart, E. J. Knapp, and J. Plaskon, representatives.

Exhibiting: A complete line of Murex Electrodes for manual arc welding. Murex Fillex, a new electrode for high-speed fillet welding and other down hand work, are featured. A welding booth for trials and demonstrations of electrodes. In addition to electrodes, the Thermit Welding process and its applications for rail welding and repairs to heavy equipment are shown as the M & T line of Carbidefree Metals and Alloys.

Metals and Alloys
New York.

Booth B-107

In attendance: H. W. Gillett, editorial director; E. F. Cone, editor; F. P. Peters, assistant editor; P. H. Hubbard, publishing director; Wm. P. Winsor, business manager; D. B. McIntosh, eastern advertising manager; G. E. Cochran, western manager; Frank J. Enright, district manager, Cleveland.

Exhibiting: Metals and Alloys, "The Magazine of Metallurgical Engineering." Also, metallurgical books.

Metals Disintegrating Co., Inc.
Elizabeth, N. J.

Booth C-306

In attendance: H. E. Hall, general manager; D. O. Noel, sales engineer; Fred Pease, metallurgist; A. W. Forrest, office manager.

Exhibiting (in operation): Metal Powders: Aluminum, copper, copper flake, lead, tin, zinc, silver, solder, antimony, iron, manganese, molybdenum silicon, titanium, and others. Also, various samples showing some applications of Metal Powders.

Michiana Products Corp.
Michigan City, Ind.

Booth A-239

In attendance: L. H. Whiteside, manager of sales; H. Klouman, factory manager; Carl Nygren, chief engineer; C. Q. Swenson, and L. J. Bohan, Detroit representatives; H. J. Georgen, Chicago representative; E. E. Whiteside, Cleveland representative; H. C. Armin, New York, representative.

Exhibiting: Stainless steel castings; abrasion resistant castings; furnace conveyors; high temperature recirculating fans.

The Midvale Co.
Philadelphia.

Booth C-233

In attendance: H. L. Frevert, president; Stuart Hazlewood, vice president; Henry H. Ziesing, general sales manager; W. B. Smyth, Cleveland district sales manager; F. N. Satter, F. J. Sleath, and H. S. Garrett, Pittsburgh district sales managers; J. C. Glass, Chicago district sales manager; M.

L. Brown, J. R. Adams, F. B. Foley, G. L. Smith, A. O. Schaefer.
Exhibiting: Display showing extrusion liner and ram for non-ferrous metals.
A pair of small forged hardened and ground rolls.
Also enlarged photographs of forgings, rings, corrosion resisting castings and other products of The Midvale Co.

A. Milne & Co.
New York City.
Booth B-314
In attendance: Henry Sears Hoyt and J. King Hoyt, Jr., co-partners; H. R. Adams, Chicago district manager; E. R. Carnell, Pittsburgh district manager; V. A. Greene in charge of Detroit sales; F. J. Grant, salesman.
Exhibiting: High speed, tool and alloy steels—spray-painted for identification; hollow die steel; Timken graphitic steels; hollow and solid auger steel; drill steel.

Modern Machine Shop and Products Finishing
Cincinnati.
Booth B-313
In attendance: Don G. Gardner, publisher; H. Campbell, editor (Modern Machine Shop); F. W. Vogel, managing editor (Products Finishing); J. M. Krings, advertising manager; G. M. Fillmore, Eastern manager; J. Vandervoort, Eastern representative; G. H. Meyers, Western manager; and J. H. Koch, Central Western manager.
Exhibiting: Displays featuring the two publications, Modern Machine Shop and Products Finishing.

Molybdenum Corp. of America
Pittsburgh.
Booth A-515
In attendance: M. Hirsch, president; W. H. Phillips, vice president; V. R. Lansingh, vice president; E. A. Lucas, vice president; Earl Steward, west sales manager; and N. F. Tisdale, metallurgical engineer.
Exhibiting: Ferro alloys, calcium molybdate and metal powders.

Monarch Steel Co.
Indianapolis, Ind.
Booth B-446
In attendance: F. T. Holliday, president.
Exhibiting (in operation): A small automatic screw machine making small parts demonstrating the extra fast machining qualities of speed case steel.
This is a joint exhibit with the Fitzsimons Co., the eastern licensee for speed case steel.

National Electric Welding Machines Co.
Bay City, Mich.
Booth A-307
In attendance: E. C. Smith, president; J. R. Brueckner, vice president; C. E. Shearer, secretary-treasurer, (sales manager), in charge of exhibit; H. C. Cogan, chief engineer: C. F. Kaunitz, chief designer; L. E. Nichols, chief welding engineer; and S. Fisher, welding engineer.
Exhibiting (in operation): (1) New Style National 200 Series Double Roll Knurl Driven Circular Seam Welder, 150 KVA capacity, together with new style General Electric Seam Welding Thyratron Control Panel. A new style National 100 Series Motor Driven Press Type Projection Welder, 50 KVA capacity, together with Westinghouse Weld-O-Tool (new style tube type contactor). A special General Electric One-Half Cycle Thyratron Welder equipped with Special National Bench Type Press Welding Head. A variety of welded samples, showing all types of resistance welding.

National Cylinder Gas Co.
Chicago.
Booth C-118
In attendance: F. A. Wirth, E. C. Stone, and O. B. Haley, Detroit; Roy Hinger, Cleveland; Chester Mott and H. C. Dowson, Chicago.
Exhibiting (in operation): The National No. 646 oxy-acetylene shape cutting machine. This model of the National has a rectangular cutting range of 6 feet wide by 4½ feet long. It cuts any thickness of plate within the present limits of the cutting torch. It has several exclusive features, resulting in greater production per hour and reduced total cutting costs. New and improved oxy-acetylene apparatus for flame hardening shafts.

National Industrial Publishing Co.
Pittsburgh.
Booth B-318
In attendance: I. Stanley Wishoski, editor.
Exhibiting: "Industrial Heating"—a monthly publication that specializes on furnaces, ovens, kilns and all industrial heating processes used in the manufacture, finishing, processing and heat treatment of metals and other products.

National Tube Co.
Pittsburgh, (United States Steel Corporation Subsidiary).
Booth B-121
Exhibiting: Seamless and welded tube and tubular products in carbon and alloy grades; tests and test data; examples of applications. See also "United States Steel Corporation Subsidiaries."

The New Jersey Zinc Co.
New York.
Booth B-106
In attendance: A. E. Mervine, manager metal sales; W. W. Broughton, S. E. Maxon, and R. L. Wilcox, technical service; D. P. Brannin, manager Chicago office; R. Burns, W. P. Hardenbergh, Jr.; R. Davison, manager market development division; E. K. Vaughan, C. R. Maxon, R. E. Kellers, and H. W. Smith, market development division; and R. G. Kenly, manager rolled metal sales.
Exhibiting: Zinc alloy die castings in the raw and finished state. A wide assortment of finished products in which these castings are used including electrical appliances, business machines, small tools and hardware. A comprehensive group of new and unusual automotive applications of zinc alloy die castings.
A feature is a revolving turret on which is mounted the radiator grilles used by Oldsmobile from 1935 through 1939. These grilles are all die cast and afford an ex-

cellent case history. The four main characteristics of zinc alloy die castings—Strength, Accuracy, Complexity, Economy—are dramatized by photograph murals on the back wall of the booth.

Norton Co.

Worcester, Mass.

Booth A-242

In attendance: C. W. Jinnette, regional manager of sales planning and development; P. H. Clapp, Detroit district manager; W. R. Moore and R. M. Johnson, sales engineers; Carl Carlson and Warren Turner, field engineers; H. K. Clark, vice president; W. T. Montague, manager sales planning and development; Paul A. Brown, W. T. Cushing, K. E. Herrick, D. L. Price, A. W. Jacques, and C. A. Crumpton, Detroit salesmen; Lucien Gay, Flint, Mich., salesman; F. L. Curtis, Jackson, Mich., salesman; H. A. Blackburn, Detroit refractory salesman; R. Kirkpatrick, assistant sales manager, Worcester abrasive division; and K. H. Bird, abrasive sales department, Worcester.

Exhibiting: Abrasives, grinding wheels, rubbing bricks and refractories of the types generally used by the steel industry. New types of diamond wheels and the latest advances in the manufacture of Norbibe (Norton Boron Carbide) gauges and accessories.

The Ohio Crankshaft Co.

Cleveland.

Booth B-260

In attendance: W. C. Dunn, president; F. S. Denneen, secretary-treasurer; W. E. Benninghoff, Tocco division manager; M. A. Tran, chief metallurgist; and A. O. Wood, Tocco superintendent.

Exhibiting (in operation): Production Tocco camshaft machine unit hardening the new Packard Six pearlitic malleable camshaft.

Production Tocco special type machine hardening the Packard transmission drive shaft at the rate of 135 per hour and producing three degrees of hardness on the same piece in one operation.

Production Tocco crankshaft machine.

Display of typical Tocco hardened parts and photo-micrographs of typical structures.

The Ohio Steel Foundry Co.

Springfield, O.

Booth A-216

In attendance: J. E. Galvin, president; T. H. Harvey, vice president; C. E. Malley, sales manager; D. W. Talbott, sales engineer; F. J. Blaney, works manager; Al Kershaw and Gordon Webb, Detroit representatives.

Exhibiting: Fahrite heat and corrosion resisting alloy castings; a number of Fahrite castings as well as descriptive literature pertaining to the many uses for alloy castings.

Tinius Olsen Testing Machine Co.

Philadelphia.

Booth B-412

In attendance: Tinius Olsen, 2nd vice president; H. L. MacBride; B. L. Lewis; T. L. Richards; and Andrew Hutton, Mid West representative.

Exhibiting (in operation): Latest design Universal Testing Machine. New (first showing) direct reading automatic Brinell hardness tester. (Production type). New automatic ductility tester. New design high magnification recorder. Full line of stiffness testers.

Page Steel and Wire Division, American Chain & Cable Co., Inc.

Monessen, Pa.

Booth C-515

In attendance: W. H. Bleecker, sales manager; F. H. Jones, district sales manager, Pittsburgh; E. J. Flood, district sales manager, Chicago; and J. E. Skinner, engineer.

Exhibiting: Various grades of Welding Wires. Welded specimens that show the various characteristics of the welds made by different types of welding wires.

Parker-Kalon Corp.

New York City.

Booth C-419

In attendance: Chas. S. Trott, general sales manager; and A. W. Meader, field engineer.

Exhibiting (in operation): Large scale models of various fastening devices. Two motor-driven mechanisms, which are for the purpose of illustrating the advantages derived through the use of Self-tapping Screws.

The Partlow Corp.

New Hartford, N. Y.

Booth, combined Ind. Gas Exhibit

In attendance: Howard W. Partlow, president; Howard W. Partlow and Alvin M. Stock, vice presidents; Michael G. Hanley, secretary-treasurer; Oliver Stirling, Jr., Detroit representative; James K. Clark, design engineer; and Albert W. Orton, factory superintendent.

Exhibiting (in operation): Model SD Gas Safety Pilot, Model M Temperature Control controlling a gas flame. No. 40 Control (throttling) controlling a gas burner, Step Control controlling one burner, Recording Controller controlling a gas flame. Different Temperature Control Units.

The Penton Publishing Co.

Cleveland.

Booth A-203

In attendance: E. L. Shaner, editor-in-chief of Steel, president. The Penton Publishing Co.; Geo. O. Hays, business manager; Steel, vice president, The Penton Publishing Co.; E. C. Kreutzberg, editor, Steel; Erle F. Ross, associate editor, Steel; A. H. Allen, Detroit editor, Steel; G. W. Birdsall, associate editor, Steel; J. D. Knox, associate editor, Steel; F. G. Steinebach, editor, The Foundry; L. E. Jermy, editor, Machine Design; R. C. Jaenke, Central Western manager, Steel; C. N. Schmidt, advertising representative, Steel; L. C. Pelott, Western manager, Steel; W. F. O'Dell, advertising representative, Steel; H. H. Dreyer, Western manager, Machine Design; S. H. Jasper, Pittsburgh manager, Steel; H. B. Veith, Central Western manager, Machine Design; C. H. Bailey, advertising service manager, Steel; J. W. Zuber, circulation manager, Steel; H. R. Dunne, circulation representative, Steel; and C. A.

Price, circulation representative, Daily Metal Trade.
Exhibiting: Magazines—Steel, Machine Design, Daily Metal Trade, and Technical Books.

Production Machine Co.

Greenfield, Mass.

Booth C-509

In attendance: William S. Howe, president; Arthur H. Behnke, vice president; and Thomas A. Welch, superintendent.
Exhibiting (in operation): Production No. 101 Patent Centerless Feed Polishing and Finishing machine for tube, rod and bar work.
Type "S" Production Centerless Polishing and Finishing machine, light duty, for tube, rod and bar work.
No. 6, 9" Production Vertical Surfacing machine.
No. 1, 9" Production Horizontal Surfacing machine.
Production Type No. 601, 4" Bench Handy Speed Finisher.
Production Type No. 606, 6" Bench Surfacing machine.
Production Type No. 608, 6" Vertical or Horizontal Surfacing machine.

Products Finishing and Modern Machine Shop

Cincinnati.

Booth B-313

In attendance: Don G. Gardner, publisher; H. Campbell, editor (Modern Machine Shop); F. W. Vogel, managing editor (Products Finishing); J. M. Krings, advertising manager; G. M. Fillmore, Eastern manager; J. Vandervoort, Eastern representative; G. H. Meyers, Western manager; and J. H. Koch, Central Western manager.
Exhibiting: Displays featuring the two publications, Modern Machine Shop and Products Finishing.

Pyro-Electro Instrument Co.

Detroit.

Booth C-534

In attendance: H. E. Yale, president and sales manager; C. E. Smith, vice president and chief engineer; C. H. Hitch, secretary-treasurer; and W. D. Wallace, engineer.
Exhibiting (in operation): Hardness Testing Instruments, manual and power operated. In addition to the standard line of Rockwelling and Brinelling instruments there is on exhibit for the first time anywhere two new models: Model "HT" Horizontal Internal Hardness Tester. Model "PR" for Rockwelling and Brinelling in volume production.

The Pyrometer Instrument Co.

New York.

Booth A-114

In attendance: A. Bollerman, secretary.
Exhibiting (in operation): Pyro Optical, Bi-optical, Micro-optical, Radiation, Immersion, Surface Pyrometers, and Radiation Tubes.

Reeves Pulley Co.

Columbus, Ind.

Booth B-420

In attendance: R. H. McLean, manager Detroit office; E. P. Waldon and R. A. Finnigan, of Detroit office; C. M. Reeves, vice president; W. R. Perry, electrical engineer; D. C. Batterson, manager Chicago office; and J. H. Gepfert, manager Cleveland office.
Exhibiting (in operation): Various units and controls in the complete line of Reeves variable speed control equipment including the Variable Speed Transmission, Vari-Speed Motor Pulley and Vari-Speed Motodrive.
Most of this equipment is motor-equipped for operation, demonstrating the principles and applications of modern mechanical variable speed control.

Robinson Welding Supply Co.

Detroit.

Booth A-543

In attendance: J. M. Robinson, owner; and R. M. Hannum, salesman.
Exhibiting: Complete line of electric and acetylene welding equipment and supplies.

Joseph T. Ryerson & Son, Inc.

Chicago.

Booth B-406

In attendance: G. Van Dyke, manager of the special steel division; Mr. Vehmeyer, manager of Detroit plant; Mr. Bowman, W. O. Springer, Mr. Proctor, Mr. Acee, and Mr. Hegel, special steel representatives.
Exhibiting: Exhibit explains "Certified Steel" with particular emphasis on the unique alloy steel quality control plan. It consists of a background panel with pictures and illuminated flasher sign. Also table for product display and furniture.

George Scherr Co., Inc.

New York.

Booth A-445

In attendance: George Scherr, president; Gustav E. Guellich, metallurgist; and George M. Kaner, service engineer.
Exhibiting (in operation): The New Busch Universal Microscope, the Metaphot; also Busch comparison microscope.
Complete line of Optical and other precision measuring and inspection equipment as follows: Instruments for measuring and gauging lengths, diameters, etc.; instruments for measuring and checking angles and angular divisions; gear testing and charting machines; instruments for checking screw threads; miscellaneous measuring, gauging and inspection instruments.

Scully Steel Products Co.

Chicago (United States Steel Corporation Subsidiary).

Booth B-121

Exhibiting: Carbon and alloy steels in flats, rounds, bars, rods, wire and shapes, tubular and other products manufactured by United States Steel Corporation Subsidiaries and distributed by the exhibitor. See also "United States Steel Corporation Subsidiaries."

The Selas Co.

Philadelphia.

Booth, Combined Ind. Gas Exhibit

In attendance: Frederic O. Hess, president; Edward L. Fortin, treasurer; Richard C. Jordan, Pennsylvania representative; E.

A. Furkert, Chicago representative; E. D. Allen, Detroit representative; W. M. Smith, Metropolitan New York representative; W. D. Fuller, New England representative; C. J. Long, New York State representative; J. W. Townsend, research engineer; J. A. Smith, Chicago office; and James Kniveton, engineer Philadelphia office.

Exhibiting (in operation): Floscopes, gas combustion controllers, Refrak screen burners, Duradiant burners, bell type furnace, miscellaneous burners.

The Selas Co.

Philadelphia.

Booth, Combined Ind. Gas Exhibit

Exhibiting: Bell Type Furnace which demonstrates a new method of firing. Dispensing with radiant tubes, the method gains uniform radiant heat distribution. Venturi-Type Air Heater which demonstrates extremely fast heating, electric ignition and flame safety control. Applicable when air is blown through or drawn through. Process-Heating Furnace, operating at 2,900° F., which demonstrates new furnace construction as well as a new method of firing. Since the equipment is for purposes of demonstration, photographs are not available.

The Sentry Co.

Foxboro, Mass.

Booth B-402

In attendance: A. A. Harvey, sales manager; P. B. Crocker, treasurer; Gerald B. Duff, Eastern New York and New Jersey representative; Western New York representatives from The R. C. Neal Co.; Northern Ohio representatives from The Cleveland Duplex Machinery Co.

Exhibiting (in operation): The size No. 1 Model "Y" Electric High Speed Steel Hardening Furnace, which by eliminating water cooling and complicated atmospheric control systems offers economy and efficiency giving uniform, controlled hardening temperatures and heats to 2,350 degrees Fahr. in less than an hour.

Also the larger new size No. 3, Model "Y" furnace for larger tools and greater production.

Constant, correct furnace atmosphere is maintained by the Sentry Diamond Block Method of Atmospheric Control, assuring tools of maximum hardness and toughness free from scale, decarburization, or reduction in size, on molybdenum, tungsten, and cobalt high speed steels. Even the sharpest cutting edges and corners are retained during hardening. Many sizes of Sentry Diamond Blocks will be on display.

Also showing the single tube Sentry High Temperature (2,550 degrees Fahr.) furnace offering greater speed and precision for combustion analysis of stainless and other steels. The furnace and terminals are rugged in construction giving an average of more than five years' service, highly efficient and economical to operate.

Shapeproof Lock Washer Co.

Chicago.

Booth A-436

In attendance: H. B. Smith, president; F. W. England, vice president; C. L. Johnson, secretary-treasurer; J. M. Gribbie, sales manager; E. W. Fuller; E. McClelland; H. Hansen; and O. J. Poupitch.

Exhibiting (in operation): Shakeproof "Sems", the patented pre-assembled lock washer and screw, is the newest addition to the line of Shakeproof Products which is exhibited for the first time to the metal working industries. Specially built laboratory testing equipment is used to effectively dramatize the advantages of Shakeproof lock washers and thread-cutting screws.

An electrically operated recording maximeter draws graphs of the relative tightening and loosening torques applied to a Shakeproof lock washer and nut assembly. Other testing machines operated include a vibration machine, which simulates actual vibration conditions encountered by fastening devices in the laboratory; a compressor tester which shows the deep indentations formed in the work surface by the tapered twisted teeth of Shakeproof lock washers when tightened; and a Torque testing machine which shows the easy driving qualities of Shakeproof thread-cutting screws.

Spencer Turbine Co.

Hartford, Conn.

Booth C-144

In attendance: F. A. Wright, special representative; R. B. Richardson, district representative; and R. A. Brackett, sales manager.

Exhibiting (in operation): Centrifugal type Turbo-compressors, Gas Boosters and Vacuum Cleaners. The low speed multi-stage centrifugal type turbo-compressor shown is of the improved design with high efficiency and exceedingly great operation. This machine offers the most reliable operation for oil and gas fired furnaces and is recommended by the leading furnace manufacturers. In addition will be shown the new design Gas Booster available in standard steel construction or with special metal for handling corrosive gases. Also demonstrating a 1½ H.P. Industrial Portable Vacuum Cleaner. Machines are available in all sizes for cleaning everything from the foundry to the office floor.

Steel Publications Inc.

Pittsburgh.

Booth D-314

In attendance: Don N. Watkins, president; N. R. Moll, vice president and secretary; Charles Longenecker, vice president in charge of editorial; W. C. Kernahan, editor of Heat Treating and Forging; H. Milton Reich, western manager; T. B. Little, eastern manager; W. B. Harvey, western representative; and F. B. Yeager, field representative.

Exhibiting: September issues of our publications, Blast Furnace and Steel Plant and Heat Treating and Forging.

Steel City Testing Laboratory

Detroit.

Booth A-223

In attendance: H. A. Weaver and Fred Valentine.

Exhibiting (in operation): 1. Revelation Direct Reading Brinell Machines 500 to 3,000 Kgs. 2. A Real Dynamic Balancing Machine. 3. Improved Ductility Testing Machine, old and new penetrators. 4. Highly

efficient and most accurate Dead Weight Brinell Machine for Laboratory and Semi-Production. 5. Highly refined spring testing machines—Ranges from 10 grams to 1,000 lbs. 6. Revelation Direct Reading Hardness Tester for light loads, using ball, diamond penetrator, and pyramid diamond. 7. Hydraulic Universal Testing Machine loads 20 to 60,000 lbs. 8. Hydraulic Universal Testing Machine load 100 to 5,000 lbs. 9. Pendulum Type Tensile Testing Machine for wire, strip, etc.

The Stirling Detroit Corp.

Detroit.

Booth, Combined Ind. Gas Exhibit

In attendance: O. Stirling, Jr., president; N. R. Williams, vice president; George Mann, Stanley Klots, and Robert Stirling, salesmen.

Exhibiting (in operation): Gas burner tips, low pressure blowers, gas-air mixers, miscellaneous industrial gas appliances.

D. A. Stuart Oil Co., Ltd.

Chicago.

Booth C-238

In attendance: W. H. Oldacre, general manager; T. B. Langdon, vice president; W. M. Duncan, engineering department; W. H. Huelster, Western sales manager; J. Y. Umbarger, Philadelphia representative; A. J. McDuff, New England representative; C. J. Nagel, New York State representative; and H. D. Frueauff, Jr., general sales department, Chicago.

Exhibiting (in operation): A new class of lubricants known as "Extreme Pressure" or "EP" recently developed by the lubricant manufacturer is displayed.

Full line of carefully manufactured Extreme Pressure (EP) industrial oils and greases, and demonstration of the difference between EP and non-EP lubricants to visitors interested in the subject by means of one or more of the better known EP lubricant testing machines.

Display of "Sturaco" Extreme Pressure (EP) industrial oils and greases, D. A. Stuart Oil Co., Ltd., are featuring their well known "Thred-Kut" oil; Stuart's "Kleen-Kut" soluble oil; Stuart's "Codol" liquid grinding compound, a comparatively new development in soluble grinding and cutting oil, Stuart's "Super-Kool" drawing lubricants (for stainless steel); as well as a display of sample parts machined with these well-known lubricants.

D. A. Stuart Oil Co. will greet their many friends in the industrial world by a newly designed exhibit, displaying intricate machined parts cut or drawn with Stuart Metal Working Oils. Printed matter illustrating and describing lubrication problems of the day will be available to those seeking information, as well as complete information on the subject of hypoid gear lubricant and Extreme Pressure (EP gear and bearing lubricants for industrial and automotive applications).

Surface Combustion Corp.

Toledo, Ohio.

Booth Combined Industrial Gas Exhibit

In attendance: Frank H. Adams, general manager; C. B. Phillips, vice president in charge of sales; W. M. Hepburn, vice president in charge of engineering; E. W. Weaver, chief engineer; H. M. Heyn, sales manager, heat treat division; E. G. deCoriolis, research director; R. J. Cowan, chief metallurgist; J. A. Comstock, consulting metallurgist.

Exhibiting (in operation): Exhibited in operation will be an atmosphere furnace for heat treating high speed steels—also a variety of burner equipment, including several new burners developed during the past year. In addition, there will also be on display numerous parts heat treated in SC furnace as well as photographs of typical recent furnace installations.

C. J. Tagliabue Mfg. Co.

Brooklyn, N. Y.

Booth C-435

In attendance: A. F. Rucks, general manager; E. D. Wacker, general sales manager; L. Van Blerkom, division sales manager; H. W. Kerr, Detroit Office manager; A. R. Anderson, Cleveland branch manager; R. H. Hix, C. C. Hurst, and F. L. Frock, sales engineers.

Exhibiting: New Superspeed Celectray Recording Pyrometer that is designed to expose heretofore uncharted, but vital, temperature changes.

New Celectray Pyrometer of the indicating type is on display. Developed to meet an economical means of obtaining throttling control of electric furnace.

New line of Tag Pressure Spring Instruments with many convenient refinements are displayed for the first time.

Tag Indicating and Recorder-Controllers are shown in either "On-Off" or "throttling" control model.

Many other instruments including the Tag Float Type Throttling Lever Controller, a complete line of Oil Testing Instruments, Etched Stem Thermometers, Hydrometers and Industrial Thermometers will be found in the Tag exhibit.

Tennessee Coal, Iron & Railroad Co.

Birmingham (United States Steel Corporation Subsidiary).

Booth B-121

Exhibiting: High-tensile steels, Cor-Ten, Man-Ten, and stainless in sheet, strip, bars, rounds, flats and shapes. Tests and applications. See also "United States Steel Corporation Subsidiaries."

Thomas Steel Co.

Warren, Ohio.

Booth A-443

In attendance: H. A. Mentall, general superintendent; M. J. Rubin, superintendent of plating department; A. D. Stevenson, Detroit district sales manager; C. H. Lewis, secretary; and W. F. Rummell, general sales manager.

Exhibiting: Exhibit consists of the various products which are manufactured in special stamping steels, in precision gauges, special finishes, non-scalloping steel, in plain bright finish; also in electro coatings of copper, brass, nickel, and zinc.

The Henry G. Thompson & Son Co.
New Haven, Conn.

Booth C-254

In attendance: J. W. Townsend, district sales manager.

Exhibiting (in operation): Display of metal cutting saws.

A power hack saw machine in operation, demonstrating the cutting efficiency of hack saw blades.

Tide Water Associated Oil Co.
New York.

Booth C-531.

In attendance: H. G. Mullen, manager, industrial products department; F. W. Hallam, cutting oil engineer; C. A. Elwood, sales representative; W. W. Walter, sales representative; and P. Ruff, engineer.

Exhibiting (in operation): Cutting oils and their application on the side and central panels.

Titanium Alloy Mfg. Co.
Niagara Falls, N. Y.

Booth A-212

In attendance: Winthrop Sargent, Jr., vice-president; E. T. Goodridge, Assistant to president; G. F. Comstock, chief metallurgist; W. G. Wellings, chief development engineer; S. T. Hareman, and K. B. Thews, development engineers.

Exhibiting: Samples of ferro titanium and zirconium alloys. Samples of foundry zircon sand and flour. Steel, iron, and aluminum castings. Zircon refractories.

Una Welding, Inc.
Cleveland.

Booth A-432

In attendance: W. B. Baker, general manager; P. J. Cella, engineer; Jack Vogler, welding engineer; and R. B. Fehr, chief engineer.

Exhibiting (in operation): Two welding machines, one automatic welding head, one Una taper, samples of welds, samples of electrodes for manual welding, samples of various kinds of tape for automatic welding, and raw material for demonstrating welding.

United States Steel Corporation of Delaware

Booth B-121

Information later.

United States Steel Corporation Subsidiaries
Pittsburgh.

Booth B-121

Exhibiting: A joint display of the products and facilities of the American Steel & Wire Company, Carnegie-Illinois Steel Corporation, Columbia Steel Company, National Tube Company, Scully Steel Products Company, and Tennessee Coal, Iron & Railroad Company.

A central structure provides two large interior booths within the display, one containing a 50-seat theatre where the 4-reel Technicolor movie "Steel, Man's Servant" and an industrial film describing the manufacture and uses of the high-tensile, corrosion-resistant steel, Cor-Ten, will be shown several times daily. The opposite space will feature graphically some of the newer concepts of hardenability which will be discussed at the Technical Sessions, together with a special exhibit of the austempering process now being commercially utilized by the American Steel & Wire Company.

The four wing walls of the central structure will consist of wide sheets of cold finished steel with a border of stainless steel strip, sweeping in from coils at the four corners to a central passageway through the booth. From the gleaming steel surfaces will appear a stream-lined train, a tractor, a bus, and an automobile in attractive bas-relief. The walls of the passageway furnish space for attractive dioramas symbolic of the manufacture and uses of steel.

Universal-Cyclops Steel Corp.
Bridgeville, Pa.

Booth A-516

In attendance: Walter H. Baker, president; Frank Garratt, J. O. Rinek, and Charles T. Evans, vice presidents; Norman I. Stotz, metallurgical engineer; Jonathan Rose, metallurgist; R. C. Bovard, Titusville works manager; Arthur Schroeder, Detroit sales manager, Universal Division; A. F. MacFarland, Detroit sales manager, Cyclops Division; George Disque, Oscar C. Beckbissinger, F. A. Jessup, and R. S. Little, sales representatives; H. R. Reese, Cleveland sales manager; and O. F. Carl, Chicago sales manager.

Exhibiting: Tool steels, stainless steels, and high grade specialty steels.

Victor Saw Works, Inc.
Middletown, N. Y.

Booth A-416

In attendance: Raymond B. Jones, Chicago district manager, and A. V. Wilson, Detroit district manager.

Exhibiting (in operation): One hack saw machine (power).

Display of hacksaw blades both hand and power.

The Welding Engineering Publishing Co.
Chicago.

Booth B-310

In attendance: Ralph S. Kenrick, editor; and M. S. Hendricks, promotion manager.

Exhibiting: Copies of the September, 1938, Metal Show issue of The Welding Engineer. Also copies of the new Ninth Edition of The Welding Encyclopedia.

Wheelco Instruments Co.
Chicago.

Booth A-306

In attendance: Leo W. Wheeler, president; R. A. Schoenfeld, sales manager; T. A. Cohen, chief engineer; J. A. Harrison, Detroit representative; C. H. Joy, Cleveland representative; and others.

Exhibiting (in operation): Several different kinds of controlling instruments mounted on panels and connected to furnace operating to show Wheelco No Contact Radio Principle. Also several Flame-otrols safety gas fired units operating to show how they protect gas fired equipment against explosion. Various types of pyrometers, resist-

ance thermometers, potentiometer and other temperature indicating devices.

Wilcox-Rich Division of Eaton Manufacturing Co.
Detroit.

Booth D-310

In attendance: S. H. Morgan, A. W. Subberra, L. J. Cox, W. L. Adams, and A. D. Gardner, representatives.

Exhibiting: The application of "Xaloy" and "Wilrich Alloys" by centrifugal casting fused to any steel. Abrasion or wear resistance with varying degrees of corrosion resistance are the inherent properties of these alloys.

Xaloy, also known as I.R. Metal, is being used extensively in the oil fields under the trade name "Di-Hard."

Wilson Mechanical Instrument Co.
New York.

Booth C-442

In attendance: V. E. Lysaght, sales manager; D. F. Sklar, development engineer; Chas. W. Smith, Detroit representative; J. P. Roberts, Cleveland representative; C. H. Thompson, Dayton representative; Paul Fee, Chicago representative; Stanley P. Rockwell Co., New England representative; and Canadian Fairbanks-Morse Co., Limited, Canadian representative.

Exhibiting (in operation): "Rockwell" Hardness Tester and accessories; and "Rockwell" Superficial Hardness Tester and accessories.

Wire Association
New York City.

Booth C-544

In attendance: Richard E. Brown, secretary of Wire Association, and publisher of Wire & Wire Products; Mrs. R. S. Spengel, secretary and treasurer, Wire & Wire Products; Capt. E. M. Dixon, advertising representative, Wire & Wire Products.

Exhibiting: Information relating to the Wire Association and the services it performs, together with an exhibit of Wire & Wire Products, the designated official publication of the Association, and the Annual Buyers' Guide and Year Book of the Wire Association.

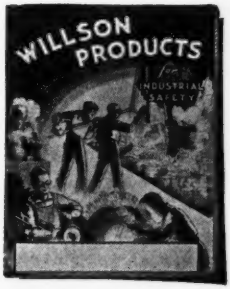
Carl Zeiss, Inc.
New York.

Booth B-211

In attendance: S. Meyer, vice president; W. G. Kramer, and Erich Friedrich, representatives.

Exhibiting (in operation): Metallograph Neophot, for bright field, dark field and polarized light observation of metal specimens at all suitable magnifications. Spectrograph QU 24" for the quantitative and qualitative analysis of metals in the industrial laboratories. The instrument is well adapted for this purpose, because it requires no particular experience, skill or complicated adjustments. Spectrumline Photometer for evaluating spectrograms in quantative analysis. Spectrum Projector for evaluating spectrograms in quantitative analysis. Feussner Sparking Apparatus, patented, keeps at a constant the energy emanating from a source of light. This is necessary in order to arrive at a truly quantitative analysis. Microscopes for the visual inspection of material. Precision measuring instruments.

Willson Products for Industrial Safety. Willson Products, Inc., 271 Thorn St., Reading, Pa.,, has just issued a new catalog of industrial devices designated as "Willson Products for Industrial Safety." The catalog, which is well illustrated covers the complete Willson line of eye, nose, throat, and lung protectors. Included are more than 50 types of goggles for every conceivable purpose, a dozen welding handshields and helmets, several United States Bureau of Mines approves respirators, air line respirators, abrasive helmets, and so on. Copy will be sent free upon request.



Willson Products for Industrial Safety Catalog

"Jenkins Patented U-Bolt Valve Bulletin No. 179." This is the title of a bulletin which is now being issued by Jenkins Bros., 80 White St., New York, N. Y., announcing a Bronze Mounted and All-Iron U-Bolt Gate Valve. This type of valve is said to combine exceptionally quick, easy disassembly for inspection or repair, with high resistance to springing and distortion.

It is stated by the manufacturer that the new valve possesses all standard features of merit. One of the unique features is a renewable "Bonnet-Saver-Bushing." This is said to eliminate the necessity of destroying the valve bonnet when operating threads are worn. A new "Bonnet-Saver-Bushing" can be slipped into position and thus a new thread engagement as in the old bonnet is obtained. The bushing can be lifted out thus the upper part of the bonnet chamber can be raised when it is desired to thoroughly clean this part of the valve.

A copy of Bulletin No. 179 will be sent free upon request.

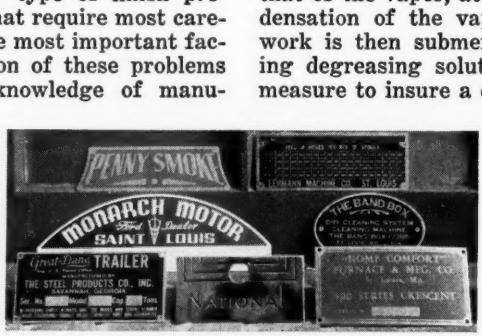
Mention PRODUCTS FINISHING when writing to advertisers. Your cooperation will be appreciated both by the advertiser and this magazine.

An Industrial Beauty Shop

Here is a plant in which any kind of finish desired on an industrial product can be obtained.

By Fred W. Vogel

ADAPTING available facilities to finishing operations in a job shop where a variety of items such as metal specialties, road signs, cigarette venders, ice cream cabinets and kitchen cabinets and utensils are finished on production schedules with practically every type of finish presents problems that require most careful analysis. The most important factor in the solution of these problems is a thorough knowledge of manufacturing and finishing processes. The second, but probably just as important factor, is that of good plant layout. A plant in which these problems are being solved successfully is that of the S. G. Adams Metalware Company located in St. Louis, Missouri. The plant and its equipment are described in this article.



Examples of the various types of finishes available for signs and name plates.

A large portion of the work finished in this plant consists of stampings which in the course of various forming operations are coated with drawing compounds that must be removed if effective final finishing is desired. A Blakeslee Type No. VPS Vapor Degreaser as shown in Fig. 1 is provided for this purpose. The workpieces to be degreased are placed on racks and baskets of special design and are then hung in the vapor section of the degreaser until the temperature of the workpieces reaches that of the vapor, at which point condensation of the vapor ceases. The work is then submerged in the boiling degreasing solution as an added measure to insure a complete removal of drawing compound. Two rather noteworthy features of this installation are the adequate exhaust and the overhead monorail conveying system. The monorail conveyer is used to carry fabricated work from the manufacturing department to the degreaser and then to the rust-proofing department.

The work that is to be sprayed with enamel is rust-proofed to prevent corrosion and also to improve the adhesive quality of the base metal for the enamel finish. A view of the rust-proofing department is shown in Fig. 2. The three tanks that are

visible in the foreground of this illustration are of 2,000 gallons capacity each. The workman can be seen lowering a rack containing several bottle dispenser cabinet covers into the Bonderite solution tank. The framework or rack on which the work is placed for the rust-proofing operation is adjustable to accommodate all sizes and types of cabinet covers. The middle tank contains cold water at room temperature and is used as a cold water rinse, and the third tank contains chromic acid.

Both the Bonderite and chromic acid tanks are provided with a solution surface type of ventilating hood that provides for complete removal of harmful fumes without permitting them to escape into the room. The type of construction employed with this type of ventilating system is of unusual interest. The two tanks having the vertical stacks are provided

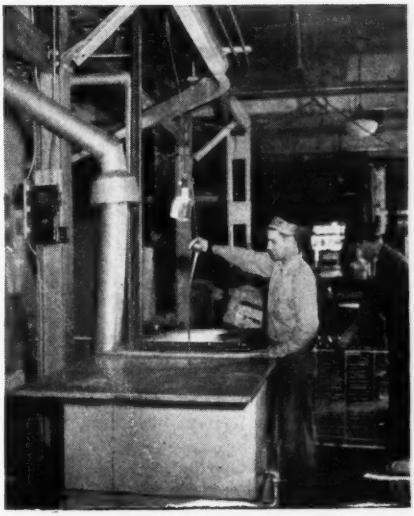


Fig. 1—Stampings that require the removal of drawing compound prior to final finish are placed in this vapor type degreaser.

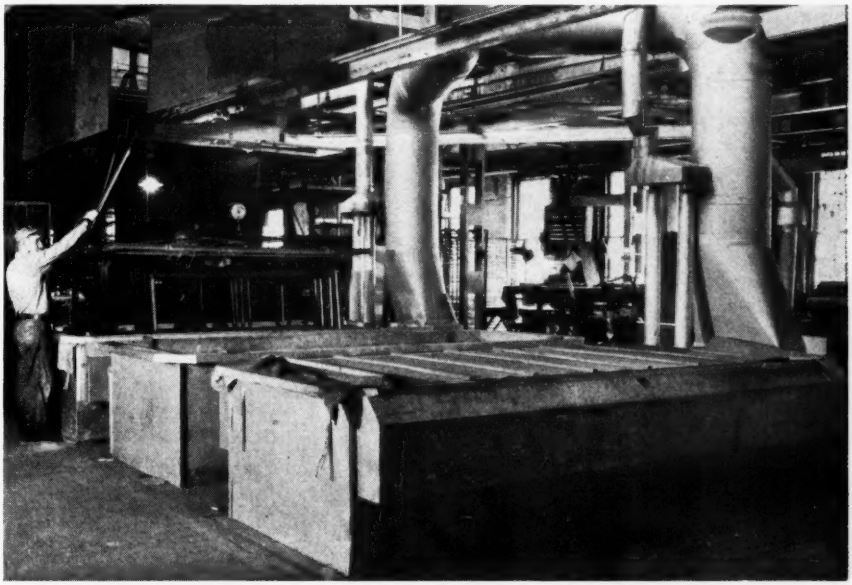


Fig. 2—Rust-proofing department showing the three tanks required for this process—the Bonderite solution tank in the background, the cold water rinse in the center, and the chromic acid in the foreground.

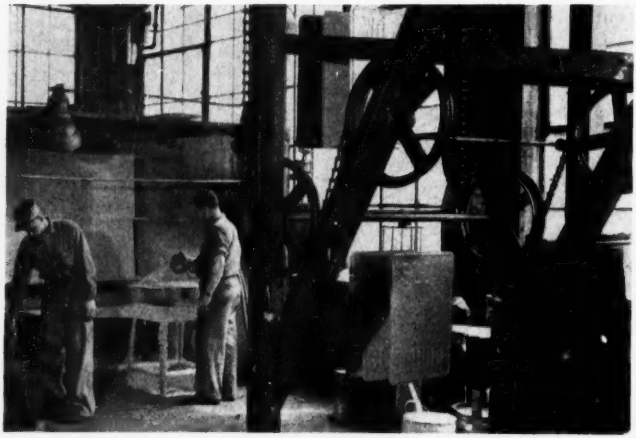


Fig. 3 — Illustration showing one of the enamel spraying booths and also the loading end of an oven conveyor.

with a box-like arrangement near the top of the tank on three sides. Thus, when a vacuum is created in the ventilating system, the fumes from the solution are drawn into the side ducts, then into the vertical stack and out into the open air.

After the workpieces have been treated with the rust-proofing solutions, they are conveyed to the enamel spraying booths, one of which, together with the loading end of an oven conveyor that is fed from the booth, is shown in Fig. 3. A close-up view of one of the individual types of spray booths is shown in Fig. 4. The operator in the illustration can be seen spraying a set of highway safety markers with a DeVilbiss type spray gun. The booth itself is one of the DeVilbiss air-ventilated type.

The excess spray that under ordinary spraying conditions accumulates on the inside and top surfaces of the booth is easily removed by coating the surfaces with a mixture of Wyandotte cleaner detergent and water before the booth is placed in operation. The cleaner and water are mixed to the consistency of a paste and applied to the surface with a paint

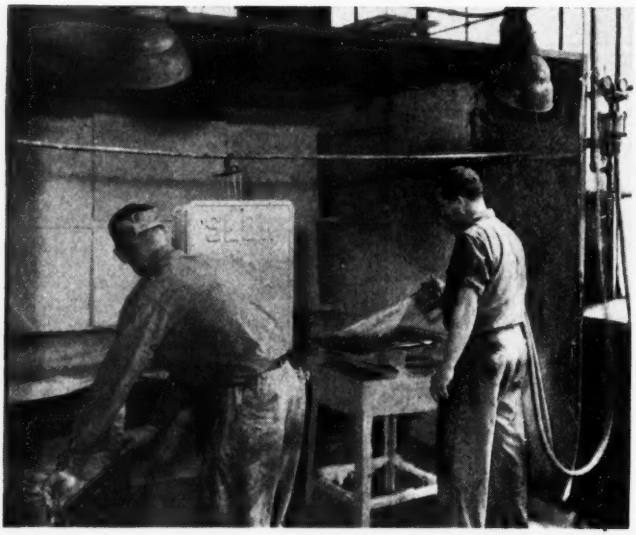


Fig. 4 — A close-up view of one enamel spraying booth.

Fig. 5—View showing how excess spray, together with a coating of Wyandotte mixture, can be peeled off the sides of the booth.

brush. Only one coating is required, if the coating is heavy enough.

Figure 5 illustrates rather clearly the ease with which the air-ventilated type of booth can be cleaned of excess spray accumulations. The excess spray, together with the coating of Wyandotte mixture, can be peeled off the sides of the booth in large sections and can then be disposed of in the usual manner. To the features of ease of preparation and application of the Wyandotte mixture coating for spray booths can be added the feature of safety, since the mixture is fireproof. The signs that are being sprayed with enamel as shown in the illustration Fig. 4 are 24 in. square. The standard rate of production of panels of this type, finished on two sides, is 70 pieces per hour.

After the pieces have been sprayed with enamel, they are transferred either to a large continuous-type oven equipped with a horizontal bar conveyor or to one of the four stationary-type ovens, one of which is shown in Fig. 6. Each stationary unit oven is 10 x 10 x 8 ft. in size. The heat is maintained at a temperature of 200

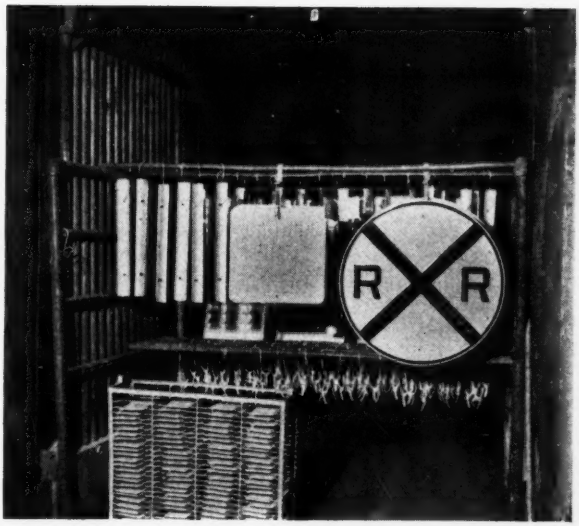
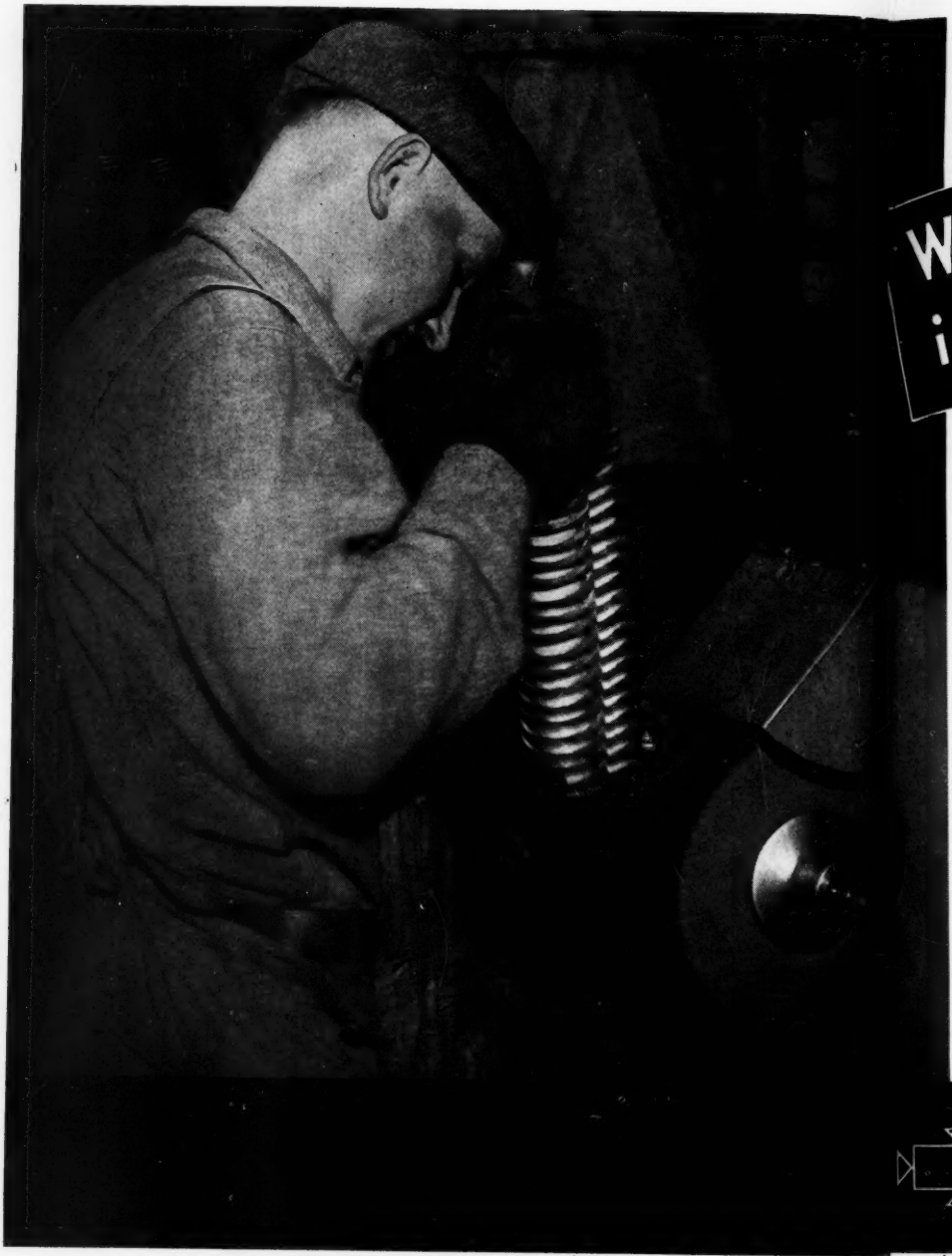


Fig. 6—The stationary ovens are of the type shown here. Each unit is 10x10x8 ft. in size.



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ALUNDUM ABRASIVE

FINISH is usually very important today—and especially for parts that are subsequently plated. The special sizing methods used in preparing Alundum Abrasive give the uniformity that assures good finish—no oversize grains to scratch and mar. And of course, the special surface treatments given to Alundum Abrasive assure extra "sticking power"—a long lasting wheel head. For "lowest cost per piece polished" it will pay you to use Alundum Abrasive.

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NORTON ABRASIVES

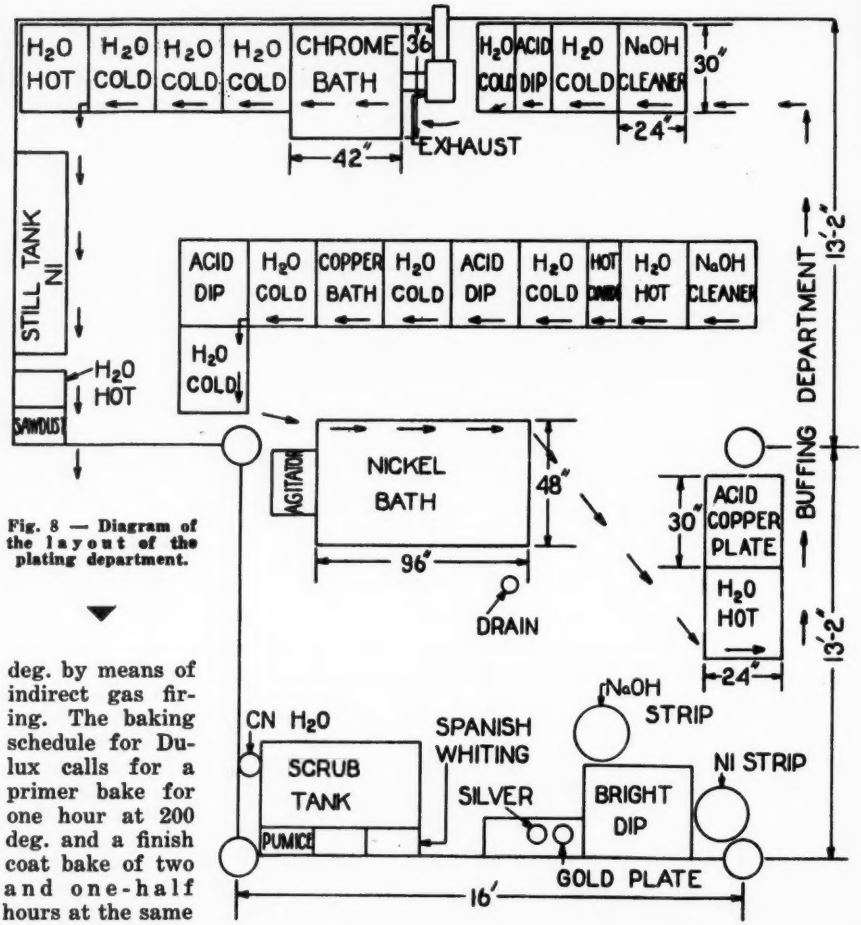

Fig. 8 — Diagram of the layout of the plating department.

deg. by means of indirect gas firing. The baking schedule for Dulux calls for a primer bake for one hour at 200 deg. and a finish coat bake of two and one-half hours at the same temperature. Much of the work is of the type that can be hung on bars but some must be placed on racks as shown in the illustration.

The department in which the work to be plated is buffed is shown in Fig. 7. This department is located directly adjacent to the plating department since it was found that this arrangement saves time in transferring work to and from the plating and buffing department before and after the various plating operations. The workmen shown in the illustration are buffing name plates prior to copper, nickel and chromium plating. The machines used are L'Hommedieu double spindle buffing lathes.

The plating department of this plant presents an excellent example of good layout as can easily be visualized by the diagram shown in Fig. 8. A photographic view of this department is shown in Fig. 9. The entire department was designed with the idea of compactness as a primary

consideration. This objective has been achieved through the placement of the tanks for the various plating operations in logical sequence, thus providing for a smooth "flow" of work through the department and eliminating unnecessary steps between tanks. The department is located on the top floor and fumes are exhausted directly to the outside. Plenty of ventilation and illumination are available at all times, thus making working conditions agreeable.

Fig. 7—One section of the polishing and buffing department where work to be plated is finished.

Following the first polishing and buffing operation, the work is conveyed to the electrocleaning tank in the plating department, in which Magnusol cleaner is used. The workpieces pass through the normal sequence of copper plating and nickel plating operations as indicated by the arrows in the diagram. The cyanide copper tank is heated by means of

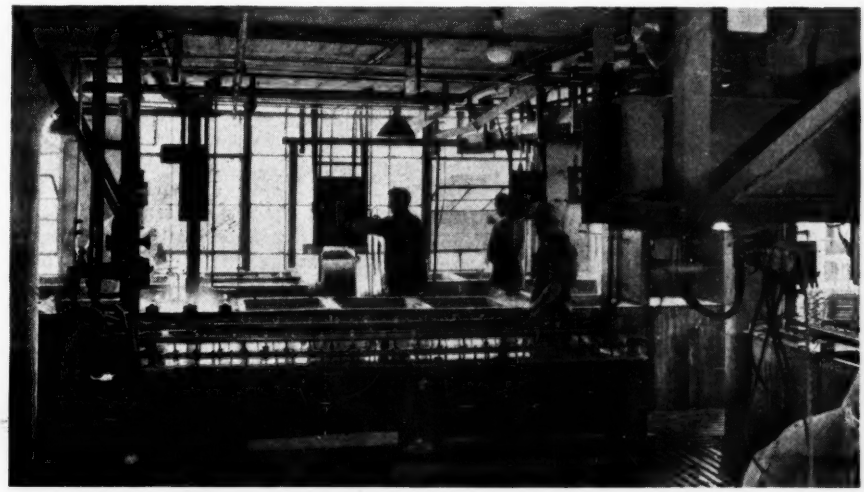

Fig. 9—Illustration showing the plating department after it was revamped according to modern design.

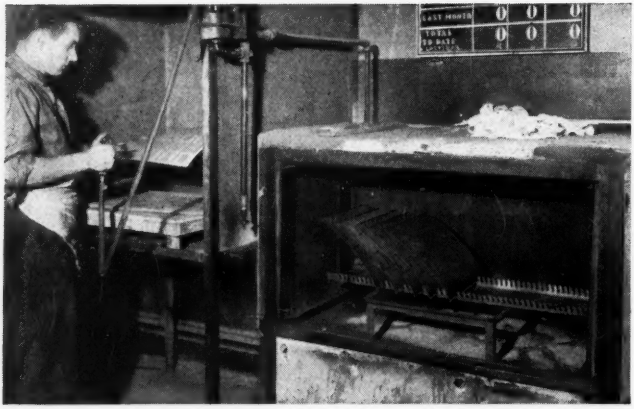

Fig. 10—Before baking the front panels of the cigarette vending machines, the excess resist compound is removed with a jet of air in the booth shown at the left of this illustration. The oven in which these panels are baked is shown at the right.

an electric immersion heater, and the temperature of the solution is controlled by means of a thermostat to within one to two degrees of the 180 deg. for which the thermostat is set. The nickel solution tank has a capacity of 780 gallons and this solution is maintained at a temperature of 135 degrees.

Plates of the type shown in process of being buffed in Fig. 7 can be plated at the rate of 28 pieces every 40 minutes. Following the nickel plating operation, the workpieces are transferred to the buffing department where they are nickel buffed prior to chromium plating. The chromium plating operation concludes the finishing operation on the name plates and they are ready to be packed for shipment. A 1000-ampere generator is used to supply current to the chromium plating tank.

Some of the most interesting finishing operations available at this plant are those applied to a cigarette vending machine. The front panel of this particular type of machine is both plated and etched. The base metal of the front panel is thin rolled copper. The design that is used on the front panel is transferred to the panel from a photolith plate by means of a rubber roll and transfer ink. The entire plate is then powdered with a resist compound consisting of beeswax, asphalt and resin. This compound adheres to the moist transfer ink left by the transfer roll and is baked on.

The design made by the transfer is a small border around the hole through which the packaged cigarettes are visible to the prospective purchaser and also around the hole through which the control handle passes. The primary purpose of applying the resist on this border is to prevent this part of the metal from becoming etched when it is placed in an acid etching vapor cabinet.

Before baking, the excess resist compound is removed with a jet of air in the booth shown in Fig. 10. The panels are then transferred to the small oven located at the right in the same illustration where they are baked at a temperature of 300 degrees. The time that is required to bake the resist compound depends upon the thickness of the metal to which it is applied. Following the baking operation, a coating of liquid asphalt is applied to the back face of the panel to prevent the acid etching fumes from attacking this part of the panel.

The panels are then placed in one

Fig. 11—View showing acid etching booths in which the panels are placed for 20 to 30 minutes.

of the acid etching booths shown in Fig. 11. Twenty to thirty minutes are required to obtain an etch of 0.005 inch to 0.008 inch. Following the etching process the resist compound is removed and the exposed part of the panel is plated. A beautiful and pleasing appearance is the result of this type of finish.

The side panels and base panels of the cigarette vending machine are finished with a wood grain finish. A large grain-etched copper plate which is an exact reproduction of natural wood grain is used as a master pattern. This copper panel is located in the trough shown in the illustration Fig. 12. The panel onto which the grain finish is transferred is first sprayed with a flat enamel ground coat and is then placed on the trestle shown in the foreground. In transfering the wood grain finish from the master pattern, the master pattern is coated with transfer ink. Rubber rollers are used to pick up the impression of the mastern pattern, which is then transferred to the panel. The wood grain finish is made permanent by the application of two coats of clear lacquer, the first of which is a sealing coat and the second a semi-gloss coating. The final result is a finish which is as beautiful as natural wood finish itself.

The application of the finishes described above involve a great deal of research and experience but the net result is the development of what has come to be one of the two principle factors in salability — appearance. Efficiency and appearance — these two — and of these appearance is by no means the least.

Fig. 12—View showing department in which panels are wood grain finished.

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Plating to Specification

By Dr. C. B. F. Young

Electrometallurgist, Flushing, New York

IN THE last few years there has been quite a bit of research conducted by the American Electroplating Society, American Society for Testing Materials, and the Bureau of Standards, to determine the thickness of metallic deposits required for various types of applications. The idea was to determine the thickness of metal or alloy required for mild and general service. Great pains were taken to see that the plates deposited were all obtained under the same controlled conditions. Test pieces exposed to different natural atmospheres were observed for a period of several years. This work has been finished for nickel, chromium, copper, zinc, and cadmium on steel. The data for other base metals and alloys are being worked out and the results will be announced later.

The results of the tentative specifications are found in the table below:

Zinc on Steel

General service	0.0005 in.
Mild service	0.00015 in.

Cadmium on Steel

General service	0.0005 in.
Mild service	0.00015 in.

Chromium, Nickel and Copper on Steel

	Cu. & Ni.	Final N.	Chromium
General service	0.00075 in.	0.0004 in.	0.00002 in.
Mild service	0.0004 in.	0.0002 in.	0.00002 in.

Other specifications will be issued as the work is finished and finally most of this will be adopted by many government departments and private concerns. Such information whether it be accepted or not, will act as a guide, and similar specifications will be written with this work as an example. After all, this is only natural, as the buyer wants to know just what is being obtained.

If the history of specification plating is investigated it will be found undoubtedly that the automobile has played a large part in bringing this to the fore. The automobile manufacturers had to protect their name by protecting their product. It was essential, therefore, that the plated parts going into the car have a definite amount of protective metallic coating. This could be obtained economically only by plating to specification. In this way the industry began to produce deposits which had a definite amount of metal or alloy deposited on the surface of the articles being plated. This, of course, began spreading to other industries. In the near future more and more plating will be done by specification. It is the only safe and economical way to produce products of uniform quality.

Cutting or polishing with a buff causes friction, friction means heat, heat deteriorates the buff and wastes the composition.

The circulation of air through AIRWAYS keeps it cool.

Cloth construction on the bias.

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WEARS TWICE AS LONG COSTS HALF AS MUCH

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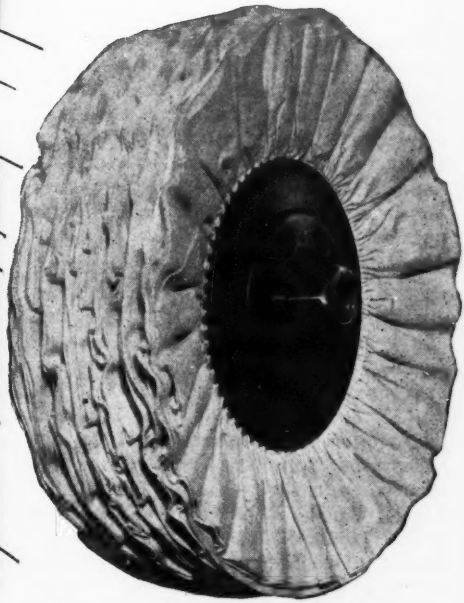
3. Eliminates burning.
4. Raveling eliminated, requires no raking.
5. Saves compound.

BUFF



Airway Buff Requires No Raking

If specification plating becomes more important, it is imperative that all electroplating plants become familiar with methods whereby the desired deposits can be obtained. This is comparatively simple for large corporations to accomplish as one of the research men of the laboratory is put in charge and he calculates the current density of the bath and then determines the amount of metal which will be deposited in a given time. From there, the time required to deposit the weight of metal desired is found. On the other hand, many of the smaller plants do not have laboratory facilities. In order to help these and also to save time for the former, a set of tables has been compiled which will aid specification plating materially.

Suppose that a "General Service" plate of zinc on steel is required. By referring to the specifications, it will be noted that 0.0005 in. of zinc is necessary. Suppose the plater uses ten amperes for each square foot. If now the table on zinc is consulted it will be found that forty one minutes will be required to deposit this thickness of zinc. Thus, at a glance the time to deposit a given thickness of metal can be determined provided the current density is known.

In each table (with the exception of chromium) the following current densities are used: 1, 5, 10, 15, 20, 25, 30, 35, 40, 45, and 50 amperes per square foot. For chromium the following current densities are used: 1, 5, 10, 15, 20, 25, 30, 50, 75, 100, 150, 175 and 200 amperes per square foot. In all cases the following thicknesses in inches are used: 0.0001, 0.0002, 0.0003, 0.0004, 0.0005, 0.0006, 0.0007, 0.0008, 0.0009, 0.001, 0.002, and 0.003. At the bottom of each compilation the grams of metal per square foot and ounces of metal per square foot are given for each thickness.

The calculation of each table is based upon the fact that for a given thickness a definite amount of metal will be deposited per unit area. This amount can be determined if the density is known. In all cases the weight of metal was found which occupied the space of 0.000083 cubic feet (1x1x0.000083). Instead of using cubic feet, cubic centimeters were found more practical. Thus for zinc:

Weight of metal=
Length x Width x Thickness x Density.

Weight of metal=
0.00254 cm. x 6.4432 x 144 x 7.1=16.72 grams.
0.001 x 1 in. x 1 in. x 144.

Now, Weight of metal deposited=current x time x electrochemical equivalent.

or, $W = CTZ$.

Assume the current to be 1 amp./sq. ft.

Z for Zinc=0.000339.

$$T = \frac{W}{C} = \frac{16.72}{1 \times 0.000339} = 49{,}200 \text{ seconds} =$$

820 minutes or 13 hours and 40 minutes.

Thus, for one square foot of surface it will require one ampere 13.6 hours to deposit a layer of zinc 0.001 in. thick. All other determinations for zinc are based on this information.

Here, it must be pointed out that the above figures are based on a cathode efficiency of 100 per cent. That is, all the current passing from the solution to the cathode reduces the theoretical amount of metal. For every 96,500 coulombs of electricity passing through the cell, one equivalent weight of metal will be reduced. This is not true in most cases, however. Generally the best current efficiency obtained is around 90 per cent. In the cases of many cyanide baths this figure may be as low as 50 to 60 per cent. A chromium bath gives the

lowest efficiency of all, around 13 to 14 per cent. Therefore, it is essential that these values be corrected for the loss of metal resulting. This can be done rather easily by determining the cathode efficiency. Assume this to be 90 per cent for the zinc bath, this means that 10 per cent of the current passing through did not deposit zinc but plated out, more than likely, hydrogen. Thus the calculations are off by 10 per cent. By adding 10 per cent more time (that is, 10 per cent of 492 minutes = 49 minutes) we get instead of 13 hours and 40 minutes, 14 hours and 29 minutes, which is the corrected time for 90 per cent cathode efficiency.

Above each table the valence, electrochemical equivalent, and density of the metal are given. From these data, the weights of metal occupying one square foot of surface and being 0.001 in. thick is calculated. The time necessary to deposit this at a given current density is now determined and is placed in its proper position in the table. The first figure appearing in each square denotes the hours, while the second one denotes the minutes required to produce a deposit of a given thickness at a definite current density. An ordinary slide rule was used in all calculations. These figures could have been determined more accurately, but this really is unnecessary as the table is as accurate as the baths used.

The last two rows at the bottom give the grams and ounces of metal per square foot for the different thicknesses. By referring to the zinc table it can be seen that to deposit at 5 amperes per sq. ft. a coating of this metal 0.0005 in. thick will require one hour and twenty-two minutes. By referring to the last two rows it will be seen that this thickness of metal has 8.35 grams of zinc or 0.295 ounces of zinc per square foot.

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CADMIUM Cd++

Electrochemical equivalent=0.0005824 grams per coulomb.
Density=8.65.
Wt.=0.00254 x 929.088 x 8.65=20.19 grams.
20.19 divided by 0.0005824=34999 seconds=582 minutes=9.7 hours.

C.D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	58	1-56	2-54	3-52	4-50	5-48	6-46	7-44	8-42	9-40	19-20	29- 0
5	12	23	35	46	58	1-10	1-21	1-33	1-44	1-56	3-52	5-48
10	6	12	17	23	29	35	41	46	52	58	1-56	2-54
15	4	8	12	16	20	23	27	31	35	39	1-18	1-57
20	3	6	9	12	15	18	21	23	26	29	38	1-27
25	2	5	7	9	11	14	16	18	21	23	47	1-10
30	2	4	6	8	10	12	14	16	17	19	39	58
35	2	3	5	7	8	10	12	13	15	16	33	42
40	1	3	4	6	7	9	10	12	13	15	29	44
45	1	3	4	5	7	8	9	10	12	13	26	39
50	1	2	3	5	6	7	8	9	10	11	23	34
g/sq. ft.	2.02	4.04	6.06	8.08	10.10	12.12	14.14	16.16	18.18	20.19	40.38	60.57
oz./sq. ft.	0.07	0.14	0.21	0.29	0.36	0.43	0.50	0.57	0.64	0.71	1.42	2.13

COPPER Cu+

Electrochemical equivalent=0.0006588.
Density=8.93.
Wt.=0.00245 x 929.088 x 8.93=21.00 grams.
21.00 divided by 0.0006588K=31990 seconds=534 minutes=8.9 hours.

C.D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	53	1-47	2-41	3-35	4-29	5-22	6-16	7-10	8- 4	8-54	17-49	26-42
5	11	21	32	43	54	1- 4	1-15	1-26	1-36	1-47	3-34	5-21
10	5	11	16	22	27	32	38	43	49	54	1-48	2-42
15	4	7	11	14	18	21	25	28	32	36	1-12	1-48
20	3	5	8	11	13	16	19	21	24	27	54	1-21
25	2	4	6	9	11	13	15	17	19	21	43	1- 3
30	2	4	5	7	9	11	12	14	16	18	36	54
35	2	3	5	6	8	9	11	12	14	15	30	46
40	2	3	4	5	7	8	9	11	12	13	26	40
45	1	2	4	5	6	7	8	9	11	12	23	35
50	1	2	3	4	5	6	7	9	10	11	21	32
g/mtl sq. ft.	2.10	4.20	6.30	8.40	10.50	12.60	14.70	16.80	18.90	21.00	42.00	63.00
oz./mtl sq. ft.	0.07	0.15	0.22	0.29	0.40	0.44	0.51	0.59	0.66	0.74	2.20	2.22

COPPER Cu++

Electrochemical equivalent=0.0003294 grams per coulomb.
Density=8.93.
Wt.=0.00254 x 929.088 x 8.93=21 grams.
21 divided by 0.0003294=63980 seconds=1068 minutes=17.8 hours.

C.D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	1-47	3-34	5-21	7- 8	8-55	10-44	12-30	14-15	16- 2	17-48	35-36	53-24
5	21	42	1- 4	1-25	1-47	2- 8	2-29	2-50	3-12	3-34	7- 8	10-42
10	11	21	32	43	53	1- 4	1-15	1-26	1-36	1-47	3-34	5-21
15	7	14	21	28	36	43	50	57	1- 4	1-11	2-22	3-33
20	5	11	16	21	27	32	37	43	48	53	1-47	2-40
25	4	9	13	17	21	26	30	34	39	43	1-26	2- 9
30	4	8	11	14	18	21	25	29	32	36	1-12	1-48
35	3	6	9	12	15	18	21	24	28	31	1- 2	1-31
40	3	5	8	11	13	16	19	21	24	27	54	1-21
45	2	5	7	10	12	14	17	19	21	24	48	1-12
50	2	4	6	9	11	13	15	17	19	21	43	1- 4
g/mtl sq. ft.	2.10	4.20	6.30	8.40	10.50	12.60	14.70	16.80	18.90	21.00	42.00	63.00
oz./mtl sq. ft.	.07	.15	.22	.29	.40	.44	.51	.59	.66	.74	1.47	2.20

CHROMIUM +

Electrichemical equivalent=0.0000898.
Density=6.92.
Wt.=0.00254 x 929.088 x 6.92=16.32 grams.
16.32 divided by 0.0000898=181998 seconds=3033 minutes=50.5 hours

C.D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	5- 4	10- 8	15-12	20-16	25-20	30-24	35-28	40-32	45-36	50-36	101-12	151-48
5	1- 1	2- 2	3- 2	4- 3	5- 5	6- 6	7- 7	8- 8	9- 9	10- 9	20-18	30-27
10	31	1- 2	1-33	2- 4	2-35	3- 6	3-37	4- 8	4-39	5- 4	10- 8	15-12
15	20	40	1- 1	1-21	1-42	2- 1	2-22	2-42	3- 2	3-22	6-44	10- 6
20	15	30	45	1- 0	1-16	1-31	1-46	2- 1	2-16	2-32	5- 4	7-36
25	12	24	36	49	1- 1	1-13	1-25	1-37	1-49	2- 1	4- 3	6- 4
30	10	20	30	40	51	1- 1	1-11	1-21	1-31	1-41	3-22	5- 3
50	6	12	18	24	31	37	43	49	55	1	2	3
75	4	8	12	16	20	24	28	32	36	40	1-21	2- 1
100	3	6	9	12	15	18	21	24	26	30	1- 1	1-31
150	2	4	6	8	10	12	14	16	18	20	40	1-21
175	2	3	5	7	9	10	12	14	15	17	35	52
200	2	3	5	6	8	9	11	12	14	15	30	46
g/sq. ft.	1.63	3.26	4.88	6.51	8.15	9.76	11.40	13.01	14.65	16.32	32.64	48.92
oz/sq. ft.	0.058	0.12	0.17	0.23	0.29	0.35	0.40	0.46	0.52	0.58	1.15	1.73

IRON Fe++

Electrochemical equivalent=0.0002893.
Density=7.88.
Wt.=0.00234 x 929.088 x 7.88=18.51 grams.
18.51 divided by 0.0002893=64140 seconds=1069 minutes=17.82 hours.

C.D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	1-47	3-32	5-20	7- 6	8-53	10-41	12-24	14-13	16	17-49	35-38	53-27
5	21	42	1- 4	1-26	1-47	2- 8	2-29	2-52	3-12	3-32	7- 4	10-36
10	11	21	32	43	53	1- 4	1-15	1-25	1-36	1-47	3-34	5-20
15	7	14	21	28	35	43	50	57	1- 4	1-11	2-22	3-33
20	5	11	16	21	27	32	37	43	48	53	1-47	2-40
25	4	9	13	17	21	26	30	34	38	43	1-26	2- 8
30	4	7	11	14	18	21	25	28	32	35	1-11	1-47
35	3	6	9	12	15	18	21	24	27	31	1- 1	1-32
40	3	5	8	11	13	16	19	21	24	27	53	1-20
45	2	5	7	10	12	14	17	19	21	24	47	1-11
50	2	4	6	9	11	13	15	17	19	21	43	1- 4
g/sq. ft.	1.851	3.72	5.56	7.42	9.28	11.10	12.95	14.80	16.65	18.51	37.02	55.53
oz/sq. ft.	0.07	0.13	0.20	0.26	0.33	0.40	0.46	0.52	0.59	0.66	1.32	1.98

NICKEL or COBALT
No++
Co++

Electrochemical equivalent (Ni÷÷)=0.0003054 grams per coulomb.
(Co++)=0.0003040 grams per coulomb.
As there is only 3 per cent difference all calculations are based on Ni.
Density=8.75.
Wt.=.00254 x 929.088 x 8.75=20.61.
20.61 divided by 0.0003054=67820 seconds=1132 minutes=18.8 hours.

C.D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	1-53	3-47	5-41	7-34	9-20	11-12	13- 4	14-50	16-48	18-52	37-44	56-36
5	22	45	1- 7	1-30	1-52	2-15	2-37	2-59	3-21	3-42	7-24	11- 6
10	11	26	34	45	57	1- 8	1-19	1-30	1-42	1-53	3-46	5-39
15	7	15	23	30	38	45	53	1	1- 8	1-15	2-31	3-46
20	6	11	17	23	28	34	40	45	51	56	1-53	2-50
25	5	9	14	18	23	27	32	36	41	45	1-31	2-16
30	4	7	11	15	19	23	26	30	34	38	1-15	1-53
35	3	6	10	13	16	19	23	26	29	32	1- 5	1-37
40	3	6	8	11	14	17	20	23	25	28	57	1-25
45	3	5	8	10	13	15	18	20	23	25	50	1-15
50	2	5	7	9	11	14	16	18	20	23	45	1- 8
g/sq. ft.	2.06	4.12	6.18	8.25	10.31	12.38	14.45	16.50	18.55	20.61	41.22	61.83
oz/sq. ft.	0.071	0.15	0.218	0.29	0.36	0.44	0.51	0.58	0.66	0.73	1.46	2.18

SILVER Ag+

Electrochemical equivalent=0.001118 grams per coulomb.
Density=10.50.
Wt.=0.00254 x 929.088 x 10.50=24.78 grams.
24.78 divided by 0.001118=22920 seconds=382 minutes=6.2 hours.

C.D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	38	1-16	1-54	2-33	3-11	3-49	4-27	5- 5	5-44	6-22	12-44	19- 6
5	8	15	23	30	38	46	53	1- 1	1- 9	1-16	2-35	2-48
10	4	8	11	15	19	23	27	30	34	38	1-16	1-55
15	3	5	8	11	13	15	18	20	23	25	51	1-16
20	2	4	6	8	10	11	13	15	17	19	38	57
25	2	3	5	6	8	9	11	12	14	15	31	46
30	1	3	4	5	6	8	9	10	11	12	25	38
35	1	2	3	4	6	7	8	9	10	11	22	34
40	1	2	3	4	5	6	7	8	9	10	19	29
45	1	2	3	3	4	5	6	7	8	9	17	25
50	1	2	2	3	4	5	5	6	7	8	15	23
g/sq. ft.	2.48	4.95	7.42	9.90	12.38	14.82	17.30	19.80	22 22	24.78	49.50	74.20
oz/sq. ft.	0.09	0.18	0.26	3.50	0.43	0.53	0.61	0.70	0.79	0.87	1.75	2.62

TIN Sn++

Electrochemical equivalent=0.0006166 grams per coulomb.
Density=7.3.
Wt.=0.00254 x 929.088 x 7.3=17.20 grams.
17.20 divided by 0.0006166=2791 seconds=464 minutes=7.74 hours.

C.D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	46	1-33	2-19	3- 5	3-51	4-38	5-24	6-10	6-57	7-44	15-28	23-12
5	9	19	28	37	46	56	1- 5	1-14	1-24	1-33	3- 5	4-38
10	5	9	14	19	23	28	32	37	42	46	1-33	2-18
15	3	6	9	12	15	19	22	25	28	31	1- 2	1-33
20	2	5	7	9	12	14	16	19	21	23	46	1-10
25	2	4	6	7	9	11	13	15	17	19	37	56
30	2	3	5	6	8	9	11	12	14	15	31	47
35	1	3	4	5	7	8	9	11	12	13	26	40
40	1	2	3	5	6	7	8	9	10	12	23	35
45	1	2	3	4	5	6	7	8	9	10	20	31
50	1	2	3	4	5	6	7	7	8	9	18	28
g/sq. ft.	1.72	3.44	5.16	6.88	8.60	10.32	12.03	13.75	15.49	17.20	34.40	51.60
oz/sq. ft.	0.061	0.121	0.18	0.24	0.30	0.37	0.43	0.49	0.55	0.61	1.21	1.82

TIN Sn++

Electrochemical equivalent=0.0003083 grams per coulomb.
Density=7.3.
Wt.=0.00254 x 929.088 x 7.3=17.20 grams.
17.20 divided by 0.0003083=5582 seconds=928 minutes=15.48 hours.

C.D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	1-33	3- 6	4-39	6-12	7-45	9-18	10-51	12-24	13-57	15-28	30-56	46-24
5	19	37	55	1-14	1-33	1-51	2- 9	2-28	2-46	3- 5	6-11	9-17
10	9	19	28	37	46	56	1- 5	1-14	1-24	1-33	3- 5	4-38
15	6	12	19	25	31	38	44	50	57	1- 3	2- 5	3- 8
20	5	9	14	19	23	28	32	37	42	46	1-33	2-19
25	4	7	11	15	19	22	26	30	33	37	1-14	1-51
30	3	6	9	12	15	19	22	25	28	31	1- 2	1-33
35	3	5	8	11	13	16	19	21	24	26	53	1-20
40	2	5	7	9	12	14	16	19	21	23	46	1-10
45	2	4	6	8	10	12	14	17	19	21	41	1- 2
50	2	4	6	7	9	11	13	15	17	19	37	56
g/sq. ft.	1.72	3.44	5.16	6.88	8.60	10.32	12.03	13.75	15.49	17.20	34.40	51.60
oz/sq. ft.	0.06	0.12	0.18	0.24	0.30	0.37	0.43	0.49	0.55	0.61	1.21	1.82

ZINC Zn++

Electrochemical equivalent=0.000399 grams per coulomb.
Density=7.1.
Wt.=0.00254 x 929.088 x 7.1=16.72 grams.
16.72 divided by 0.000339=49200 seconds=820 minutes=13.6 hours.

C.D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	1-22	2-44	4- 6	5-28	6-50	8-18	9-34	10-56	12-18	13-40	27-20	41
5	16.4	33	49	1- 6	1-22	1-38	1-54	2-12	2-27	2-44	5-28	8-12
10	8.2	16	24	32	41	49	57	1- 5	1-13	1-22	2-44	5-28
15	5.5	11	16	22	27	33	38	44	49	55	1-50	2-45
20	4	8	12	16	20	25	29	33	37	41	1-22	2- 3
25	3.3	7	10	13	17	20	23	26	29	32	1- 5	2-10
30	2.7	5	8	11	14	16	19	22	24	27	54	1-21
35	2.3	4	7	9	11	14	16	18	21	23	46	1- 9
40	2	4	6	8	10	12	14	16	18	20	41	1- 2
45	1.8	4	5	7	9	11	13	14	16	18	36	55
50	1.6	3	5	6	8	10	11	13	14	16	33	49
g/mtl sq. ft.	1.67	3.34	5.01	6.7	8.35	10.03	11.70	13.38	15.02	16.72	33.44	50.16
oz/mtl sq. ft.	0.059	0.188	0.177	0.236	0.295	0.354	0.413	0.472	0.531	0.590	1.180	1.770

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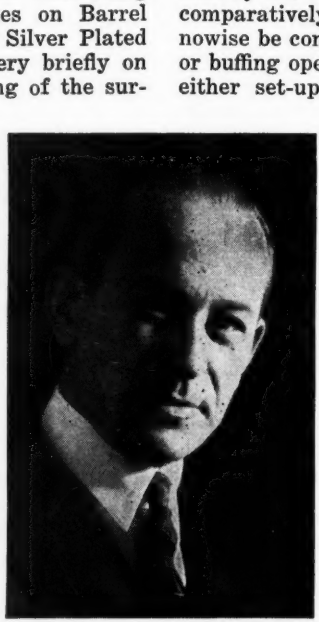
Barrel Finishing of Metal Products

Eighteenth Article of Series—Surface hardening by the barrel process to resist wear and corrosion

By H. LEROY BEAVER

IN the August Issue of Products Finishing, being the concluding paper of the inter-series on Barrel Finishing of Silver and Silver Plated Ware, we commented very briefly on the question of hardening of the surface by the barrel finishing action so that it would resist both corrosion and wear.

Apparently this is a factor that has escaped the attention of many barrel operators for we have already received a great many letters as well as personal requests for additional information covering this phase of barrel finishing.



H. Leroy Beaver

As is very well known both solid base metals as well as practically all electro-deposited coatings are porous or else the molecular structure is such that for our purpose we may consider them as porous, and where the electro-deposited plating is deposited at various thicknesses depending on the shape of the part, we can only consider the surface to be as stable as the thinnest part of the plate deposited on the base metal.

The explanation of the matter of hardening to resist wear and corrosion by the barrel finishing process is comparatively simple, and should in nowise be confused with any polishing or buffing operations done with wheels either set-up or with various forms of compositions. In the case of wheel finishing the high peripheral speed of the wheel coupled with the cutting power of the abrasive material used will cause any coated metal in its plastic form to flow along the line of least resistance and thus provide a brilliant surface, but this does not necessarily imply that the surface will be any denser, harder or more resistant to wear and corrosion, but on the contrary the intense heat generated at the point of contact of the rapidly revolving abrasive coated wheel with the part being operated upon would rather have a tendency, even though it might be slight, of softening or rendering more plastic the surface, by what we might term a slight annealing.

As contrasted with the above, the action that takes place in a revolving

burnishing barrel is entirely different for here the movement of the burnishing mass is much restrained and the factor on which we rely for producing our polished surface is the action of the resultant force within the burnishing mass against the parts seeking to pass through it, and again we repeat that most emphatically it is not the action of the burnishing material rolling over the parts being finished that produces the final results.

In this discussion we are not referring to the final high lustre finish of barrel burnished parts even though this is incident to the operation under discussion. When a load of parts either plated or otherwise are placed in a burnishing barrel they are, immediately the barrel is placed in operation, subjected to great pressure. This pressure has a tendency to compress the molecules forming the metal or metal coating, and in this compression action any porosity of the plate or irregular formations of molecular construction are reduced to an even surface plane. The plastic coating under this pressure will also tend to flow along the line of least resistance and thus force the metal to close the pores and as well equalize the high and low points of the molecular structure. Or expressed a bit differently, in a rough surface we have both high lights and low lights and the operation of the pressure of the burnishing mass against the parts passing through it seemingly moves the high points down into the depressed areas or low lights and thus provides an even plane, but in so doing the plasticity of the metal is very materially reduced, in other words, the surface is hardened.

The extent to which metal coatings will become harder and denser is of course directly proportioned to the size of the barrel, the quantity of load of burnishing material, and the form

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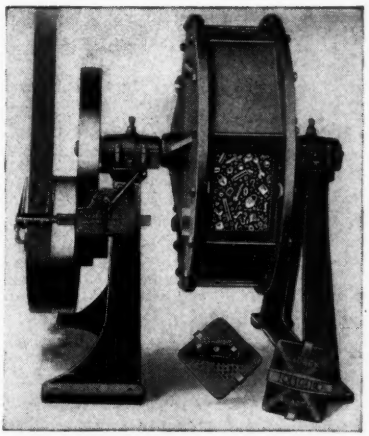

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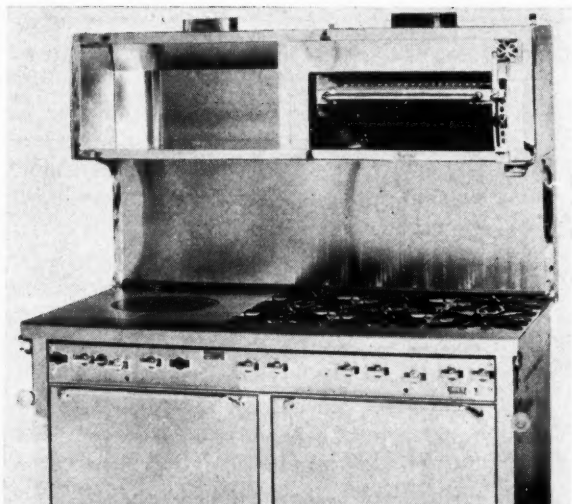
of the burnishing materials required for its operation. A barrel eight inches in diameter and twenty-four inches long will nominally require about 125 pounds of steel burnishing materials or about 10 quarts in bulk which of course will be distributed over an area twenty-four inches long. On the other hand a barrel twenty-four inches in diameter and eight inches wide will require approximately 300 pounds of burnishing materials or about 25 quarts in bulk, spread in a deep dense mass only eight inches wide. Now if we were to take a given lot of let us say copper plated parts, place a properly proportioned quantity in each of the two barrels above described, and then operate both barrels for one-half hour, at the end of that time we would have a marked difference in the parts coming from the two barrels. So far as comparison of surface appearance goes they would both be brightly burnished, but miroscopic examination would disclose that the parts coming from the high and narrow barrel would have a much closer denser surface than the parts coming from the long and narrow barrel. Indeed the difference is so marked that if the two lots of parts were to be purposely mixed one could easily distinguish from which barrel a given part was taken by simply applying a vernier micrometer. Aside from the type of barrel used another equally important factor is the type of burnishing materials used. Round balls offer the least resistance to parts passing through the burnishing mass. Formed burnishing materials such as Balcones, Finbals, Diagonals and Diamonstels have been estimated to set up anywhere from 60 per cent to 75 per cent greater resistance to parts passing through them than with round balls, hence the density as respects porosity



High Polish Finish

The heavy duty gas range shown here is designed for use in restaurants, hotels, public and private institutions. The body of the range is one of its unusual and attractive features. It is made of Armco stainless steel of 18-8 type and has a high polish. This high polish finish adds much to the attractiveness, greater durability and easy-cleaning qualities of this type of range.

(Photo courtesy American Rolling Mill Company)

for resistance to corrosion and hardness to resist wear are brought out far more fully and completely by using the formed type of burnishing materials.

Now suppose with the type of barrel we have, the load and kind of burnishing materials, we do not secure the desired density and hardness, what then? As we have previously stated the size of the barrel and the quantity and form of the burnishing materials are directly proportioned to the results we will secure. A load of 300 pounds of material operated in a barrel 24 inches in diameter and eight inches wide at 25 r. p. m., for 30 minutes will reduce the plasticity of the coated surface just so much and no more, because we would have reached the maximum of pressure exerted by the load while in movement. Now were the barrel larger and the load heavier the surface of the parts would of course be denser up to the point of the elastic limit of the metal coating. Beyond this we could not go far to do so would involve a tearing apart of the molecular structure and forced failure of the plated surface, and this brings us to another phase of the subject in which the author can only comment and suggest a further procedure.

When we reach a point in working any metal where further operation would tend to involve tearing or failure of the molecular structure, and where still greater density was required, we have but one recourse and that is to resort to one or more annealing operations to restore the metal to its original plasticity even though it be more dense, and on this phase we would comment as follows:

Annealing is a process for treating a metal or alloy by heat with the object of imparting to it a certain condition of ductility, (plasticity) extensibility, or a certain grade of softness with all that is involved in and follows from those conditions. Of the

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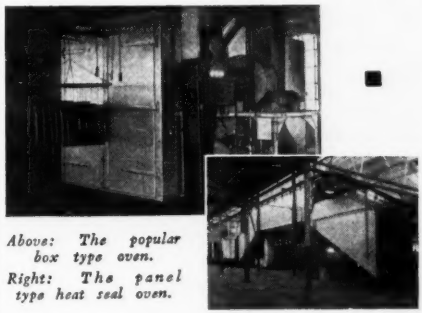

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actual facts and the immense importance of this operation as well as the related ones of tempering and hardening in general manufacturing practice, there can be no question.

When the treatment is of a mechanical character only there can be no reasonable doubt that the common belief is correct, namely, that the metallic crystals or fibres undergo a molecular re-arrangement of some kind.

Numerous examples of annealing due to molecular re-arrangement might easily be selected from the extensive range of general shop operations. For an example when a boilermaker flanges a boiler head he bends the edges of the round discover a form either by hammering or by pressure with a flanging machine, but this is done in successive stages (heats) at each of which the plate must be reheated, with inevitable cooling down during the time work is being done upon it. The result is that the plate becomes brittle over the area that has been subjected to the flanging treatment and this brittleness is not uniformly distributed, but is localized and therefore a source of weakness inducing a liability to crack. If the flanged head when finished is raised to a full red heat and allowed to cool down away from access of free air, such as in a muffle furnace or else under some retarding material it then resumes its original ductility or in other words, has been annealed.

As another illustration, when a sheet of thin metal is forced to assume a shape widely different from its original plane aspect such as by hammering out or by deep drawing out in a press—a cartridge case would be a good example—it is necessary to anneal the part one or several times during the succeeding steps in the operation. Without such annealing it could never be brought to its finished state but would become torn apart by the extension of its metallic fibres.

In these examples, and others of which these would be typical, two conditions are essential, one being the grade of temperature, the other the cooling. The temperature must never be so high as to cause the metal to become overheated with risk of burning, nor so low as to prevent the penetration of the parts with a good volume of heat. It must also be continued for a sufficient time. More than this cannot be said. Each particular piece of work requires its own treatment and period, and nothing but experience of similar work will help the operator.

It has been suggested that immersion in boiling water for a given period of time would constitute an annealing and provide for further safe working, but at a temperature of only 212 F. we doubt whether the hardness would be reduced by more than a single point.

Regard must be had for the melting point of the metal to be annealed, and we give the following table of melting points for the more popular metals, the figures being in Degrees C.

Tin	231.9	Silver	962
Cadium	320.7	Gold	1064
Zinc	419	Copper	1082
Aluminum	655	Nickel	1427

The ductility of a metal to a higher degree than its malleability is determined by its tenacity. Tin and lead though very malleable are little ductile. The quality of plasticity which we are discussing is developed to a very different degree in different metals and even in the same species it depends on temperature, and may be modified by mechanical or physical operations. For example zinc cast into a bar will be very brittle but if the bar is heated to from 100 to 150 degrees C it becomes sufficiently plastic to be rolled into the thinnest sheet or to be drawn into wire. Such sheet or wire then remains flexible after

cooling, the original only loosely cohering crystals having been intertwined and forced into absolute contact with each other.

Copper, silver and other metals in this class are quite easily drawn into wire, rolled into sheets or flattened under a hammer, but all of such operations render the metals harder in exactly the same sense as barrel finishing pressures render such metals harder and detract from their plasticity. Their original softness can be restored to them by "annealing", by heating them to redness and then quenching them in cold water. This however not applying to iron or steel which would become hardened or tempered by such a procedure.

What we call "plasticity" must however not be confused with the idea or understanding of "softness" which of course means the degree of facility with which the plasticity of a metal can be discounted. Lead is softer than silver and yet silver is the more plastic by far. Among what we would call plastic metals the softness decreases in about the following order; lead—pure silver—pure gold—tin — copper — aluminum — platinum and pure iron.

The ordinary metals in regard to the degree of facility with which they may be flattened with a hammer, rolled into sheets or drawn into wire would form the following descending scale.

Hammering	Rolling into Sheet	Drawing into Wire
Lead	Gold	Platinum
Tin	Silver	Silver
Gold	Copper	Iron
Zinc	Tin	Copper
Silver	Lead	Gold

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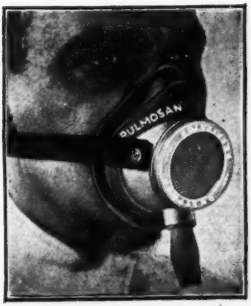

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R-110 Respirator
Protects against fine dusts. Safe, comfortable, weighs only 2½ oz. Inexpensive filters easily changed.

Hammering	Rolling into sheet	Drawing into wire
Copper	Zinc	Zinc
Platinum c	Platinum	Tin
Iron	Iron	Lead

To give an idea of what might be done in this way we might say that a skilled artisan by handling the metal between layers of gold beaters skin can hammer gold into thin leaves of the thickness of 1/3800 m/m, and platinum by careful handling has been drawn into wire only 1/20,000 m/m thick.

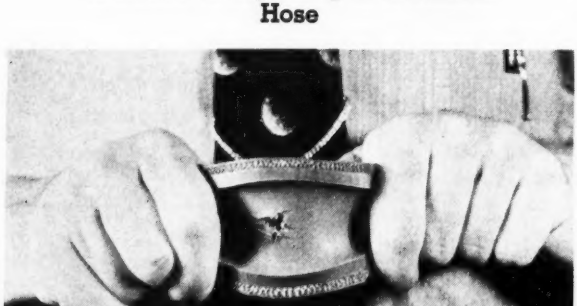
Taken into consideration with plasticity we should also mention "elasticity" to say that all of the metals under discussion would be elastic to the extent that a change of form brought about by stress not exceeding certain limit values, will disappear on the stress being removed. Stress exceeding the limit of elasticity will result in appreciable permanent deformation, and if sufficiently great in rupture, but it is extremely doubtful whether sufficient stress could be developed in the present day burnishing barrels to force any of these metals to anywhere near the point where rupture might occur.

In the annealing process the use of high flash tempering oil might produce some interesting results. Oils of this type may be secured that will function well at temperatures up to 500 degrees.

True there are many cases where the additional operations involved by annealing to reduce plasticity so that greater density could be had to resist both corrosion and wear would not be warranted, but then again we do have applications wherein plated products are subjected to extremes of exposure to the elements and other conditions wherein the properties of resistance to corrosion and added hardness to resist wear, would be definitely important factors. So that those readers who have expressed an active interest in this phase of barrel finishing, now have an additional avenue along which their research work may be continued.

In determining the size of barrel to be used, the weight and kind of burnishing material as well as the proportion of burnishing material to work, these factors must be such that when in operation the process will not

A Stroke of Lightning in a Rubber Hose



The ruinous effects of static electricity on ordinary sandblast hose is illustrated herewith. This hose has a wall thickness of ½ in. and it is estimated that it took a charge of more than 100,000 volts to penetrate this thickness. Despite the fact that the hose had been in use only a short time, this puncture necessitated replacement. Recently, The B. F. Goodrich Company, Akron, Ohio, introduced a sandblast hose which is designed to overcome the accumulation of static electricity. A ground wire is provided in the heart of the hose wall so that discharges of static tend to ground through the wire rather than through the body of the operator.

result in appreciable permanent deformation of the parts in process.

To those readers who have submitted problems for solution and in some instances samples, whether direct or through Products Finishing, we can only say that we are far behind in this work, but we are taking these matters up in the order in which they were received. We are proceeding as rapidly as possible, and to those who have not as yet received their determinations and recommendations we would ask their patience, and their determinations will be sent direct at the earliest possible moment.—HLB.

"Pickling Made Efficient With Rodine". This is the title of a 52-page catalog devoted entirely to the subject of pickling and the effective Rodine in the pickling bath which is now being issued by American Chemical Paint Co., Ambler, Pennsylvania. Important topics such as Principles of Pickling, Rodine, General Instructions for Pickling, Information on Specific Classes of Pickling, and so on are profusely illustrated and clearly described.

A copy of "Pickling Made Efficient With Rodine" will be sent free upon request.

Fairbanks-Morse Bulletin 2260. Fairbanks-Morse direct-current motors, manufactured by Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill., are described in a bulletin designated as Bulletin 2260. The motors are supplied in sizes up to 200 h.p. with a variety of mechanical modifications for both high and low voltage operation. Motors with ratings up to and including 7½ h.p at 1750 r.p.m. are built with NEMA frame and mounting dimensions. The open-construction, ball bearing motors and in ratings of 10 h.p. at 1750 r.p.m. and larger have frames especially adapted to larger machines.

Construction details of F-M direct-current motors in their various sizes as described and illustrated in Bulletin 2260 will be sent free upon request to anyone who requests this information upon a business letterhead.

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Plating-Generator Brushes and Their Job

By L. L. STOFFEL
Research Engineer, The Ohio Carbon Company, Lakewood, Ohio

TO THOSE who regard the brushes of a motor or plating generator as being merely a means to convey the current from the moving armature to the outside circuit and tanks, etc., it may be a surprise to learn that carrying the current is only one of several functions they must perform —and not necessarily the most important one, either. Since some of these functions demand opposite qualities, every brush is a compromise between them, designed to fit the particular needs of each machine-type.

What a Brush Must Do

It must be hard enough to stand up to the friction of the running commutator without undue wear. On the other hand, if too hard it is liable to form a highly-glazed surface which is practically a non-conducting film. In the case of a motor, this may lead to sparking—more particularly at starting, when the supply voltage pierces through the insulating skin. In a plating generator, glazing would probably result also in the machine refusing to excite at all. Because of the much higher voltage, a motor brush may be, and generally is, considerably harder than a plater brush. Brushes are classified according to sceleroscope hardness test, and vary from the softness of a lead pencil up to about twice the hardness of commercial brass.

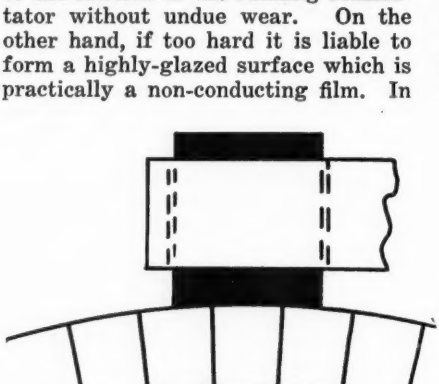

Fig. 1—Diagram showing bars short-circuited by passing under the brush. The resistance of the brush cuts down the current surge during the operation.

Its current-carrying capacity must be sufficient to handle the proper load without excessive heating. In practice, the ratings given by brush manufacturers are based on a temperature rise of 50 degrees Centigrade above the surrounding air. Since temperature has a decided effect on brush resistance and on that between commutator and brush, no brush should be overloaded beyond normal current.

Its specific resistance, which is based on the ohms between two opposite faces of a one-inch cube of the particular brush material, must be low enough not to absorb more than a small percentage of the total voltage available; and at the same time high enough to produce, in conjunction with the "contact resistance" between brush and commutator, enough voltage drop

to take care of the commutation needs. The specific resistance of a motor brush may be about .0023 ohm. A plater brush, however, is much less--sometimes as low as three millionths of an ohm.

Its abrasiveness, or the mechanical grinding and polishing effect which it exerts on the commutator, must be high enough to prevent oxide or dust from forming a non-conducting skin at the running surface of the copper commutator bars. At the same time it must not be so high that it causes excessive wear. Abrasiveness must not be confused with hardness. The two are not necessarily the same; just as a perfectly-polished diamond, though far harder than a steel file, would have less grinding action on a metal surface than the latter. Moreover, the amount of abrasiveness depends not only on the inherent qualities of the brush itself but also on the polish of the commutator and brush faces, the speed of the commutator, and on the brush pressure. Because of these numerous factors, there is no exact standard of abrasiveness—most makers' ratings being simply comparative figures. The least abrasive grades are generally termed "non-abrasive".

"Contact Drop"

Contact drop is one of the most important factors. On its correct value for the particular machine on which the brush is installed depends very largely whether the sparking is negligible or whether it constitutes a regular fireworks display. As already mentioned, this contact drop is the drop in voltage between the running faces of brush and commutator. It is always considerably greater than the volts' drop due to the resistance of the brush itself. For example, a brush of the grade known as B-1, (a general-purpose motor brush,) has a current-rating of 40 amperes per square inch of contact surface. Such a brush one cubic inch in size and having one square inch of contact surface has an ohmic resistance of .0011 ohm; and its voltage drop at rated load would therefore be .044 volt. The contact drop, however, is about 1 volt, or more than twenty times as much. A plating generator brush would have about the same proportions of contact and ohmic drop, but on account of the much lower terminal voltage of such a machine its contact drop would be more likely to be around one quarter volt.

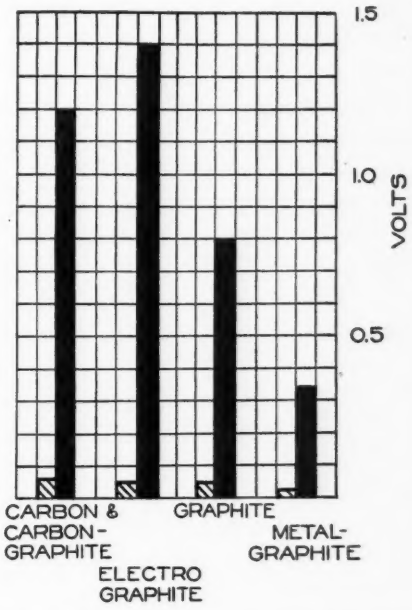

Fig. 2—Graph showing average relations between contact and ohmic drop for carbon, carbon-graphite, graphite, electro-graphitic and metal-graphite brushes.

Brush Pressure

This factor has a considerable effect on contact drop. The harder the pressure, as a rule, the lower the contact drop; but the greater the abrasive

effect and the heating of commutator and brush. A good general rule is to use the lowest possible brush pressure which will give good contact, and seldom under 1¾ lbs. per square inch of brush surface—although some types may need as little as 1¼ lbs. per square inch. If it is found at any time that excessively great pressure is needed to reduce sparking it is well to consult the brush manufacturer's tables; and if there is any wide discrepancy with actual pressures needed, to look out for some defect in the running conditions, or with the grade of brush if different to that originally supplied with the machine.

Coefficient of Friction

This is a difficult thing to measure, but fortunately very few people apart from machine designers and brush manufacturers have to concern themselves with it much. If excessive for the work it has to do, it obviously wastes some proportion of the total power available, but that proportion is small. Besides, it may be assumed that the designer knew his job, and unless on specific advice from the maker the grade of brush used originally should be used on all replacements.

There are five main types of brushes — carbon, carbon - graphite, electro-graphitic, graphite, and metal-graphite. Most motor brushes are of the first two types. Electro-graphitic brushes, which are made by converting carbon into graphite in an electric furnace at a temperature closely approaching that of the sun itself, are used for certain kinds of high-speed generators and motors; as also are graphite ones, (which are made from graphite backed at moderate heat intensity.) Metal-graphite brushes are used in plating generators and other low voltage machines. They consist of graphite or carbon intimately mixed with very finely divided metal grains so as to lower their resistance, while still maintaining a certain amount of contact drop.

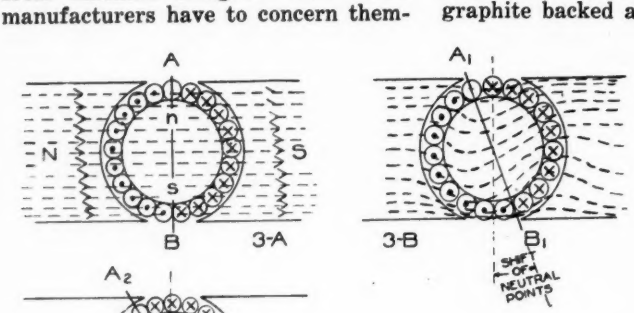

Fig. 3—Distortion of Field and Commutating Position due to armature reaction of load. 3-A shows the direction of the field when no current flows in the armature. 3-B shows the distortion produced by the fact that the armature on load becomes a magnet having poles at right angles to those of the main field. 3-C shows the further distorting effect produced if it is necessary to move the brush position due to causes in 3-B. The extra distortion of the commutating position in 3-C is on account of the demagnetizing effect of that belt of armature conductors lying between the actual and the theoretical brush positions. This demagnetizing field produces armature poles which directly oppose the main field, as shown at n-s, 3-C.

How Brushes Help Commutation

The effect of contact drop and brush resistance may now be considered. This combined drop is not, as one might

suppose, a disadvantage. On the contrary, it is the most valuable property which a brush possesses. It fulfills two main functions. It prevents sparking, and it tends to avoid the fault which was so pronounced in the older types of generators and motors having only copper gauze brushes — the shifting of the proper brush position with every change of load.

Sparking is primarily caused by the fact that each coil in the armature is successively short-circuited as the commutator bars to which its ends are connected pass under the brush. Even when the brush position is set very carefully for a given load, it is almost impossible to locate the exact spot around the armature at which the current in the shorted coil is exactly zero. Any change of load, moreover, naturally causes a change in the reaction between the magnetic fields of the armature and the poles; and this in turn causes the "zero-current" commutating position to shift. The result of short-circuiting even as low a voltage as that of a single coil is quite sufficient to send a considerable current through the almost infinitesimally small resistance it possesses. Sparking naturally results. By the use of carbon, graphite or kindred type brushes, the resistance between one short-circuited bar and its neighbor is sufficiently increased to restrict the current-surge which would otherwise take place, and the sparking is thus eliminated. Moreover, should the changing load tend to alter the proper commutating position, the combined contact and ohmic resistances act as "ballast" and to prevent the change from taking place.

It is clear from the above that the manufacture of a carbon, graphite or similar brush demands the most careful checking up on all the qualities mentioned. Contact and ohmic resistance, in particular, must be controlled within exceedingly small limits. This will be evident when one considers what would happen if one or more brushes on a single stud differed in resistance to any noticeable degree. The brushes of lower resistance would take more than their share of the load, while the rest might carry hardly anything. This is termed "selective action" and is often the cause of many mysterious commutation troubles which do not yield to the usual treatment of re-bedding of brushes, altered brush spring pressure and cleaning of commutator. But the difficulty of controlling the percentage variation of a brush whose total is only a few thousandths of an ohm altogether may be imagined. That is why the laboratory of a brush manufacturer is always busy. It has to be.

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Model Finishing System in Tractor Plant

By BARTLETT WEST

A completely new finishing system in the new Allis-Chalmers tractor plant is a model of efficiency which embodies many radical departures from previous practice in finishing products of that type and size. The layout of the finishing system was not restricted by building characteristics and other factors which usually govern plans for such installations to be made in plants already erected. The section of the building which houses the new Mahon Finishing System was designed around the finishing equipment with all necessary provisions incorporated in the original building plans—the entire tractor plant being new, modern construction.

The Mahon Finishing System consists of two complete units—one of the east side of the building and one on the west side. Each unit accommodates two separate production lines. Overhead continuous trolley conveyors carry two lines of complete tractors through each unit of the finishing system.

Each unit consists of a two-stage washing machine, four spray booths and a baking oven. The first stage of the washing machine cleans the tractor thoroughly with an alkali solution sprayed at a rate of 1200 gallons per minute at 180 deg. F. The second stage rinses the tractor in a similar manner except that clear clean hot water is used. Reservoirs for both tanks have large capacities; the water being heated by steam in external instantaneous hot water heaters.

The spray booths are of latest Hydro-Filter type designed and especially arranged to meet the particular requirements of this system. Two of the booths are installed for each conveyor line. These booths are staggered so that one sprayman paints one side of the tractor and another in the next booth, located on the opposite side of the line, paints the other side. An interesting feature of this installation is the reservoirs or water tanks for the Hydro-Filter units. These reservoirs extend completely through under the tractors on the conveyor line, thereby permitting the overspray, which would otherwise fall on the floor, to be picked up on the surface of the water. Another interesting detail is the recession of all reservoirs for the washing machines and the spray booths below the floor level. Pumps, strainers and other accessories are also located in pits in the floor.

The baking ovens are designed with silhouette sleeves at each end which closely fit the outline of the tractors and which are long enough so that before one tractor leaves it another closes the opening. This method of sealing the ends of the oven permits oven heat to extend from one end to the other without heat losses generally considered at each end of a continuous oven of this type which does not have a bottom opening or natural heat seal. The ovens are heated with butane gas with a recirculating type heater. Each oven accommodates two conveyor lines and the temperature is automatically maintained within a 5 deg. range.

The tractors are assembled completely, less wheels and are block tested and run in before they are placed on the conveyor line which carries them through the finishing system. With the exception of wheels and paint, the tractors are ready to leave the plant before they enter the finishing system. This presented several problems which were successfully solved by the development engineers. Considering that the tractors are ready for operation before entering the finishing system, the problems included keeping water out of gas tanks, crank cases and ignition systems and maintaining a temperature in the ovens which would not be detrimental to oil, grease and other materials which are vulnerable to excessive temperatures.

One of the important features of the complete installation is the overhead trolley conveyor. Many of the tractors are equipped with pneumatic tires which would interfere with the spray painting operations. This, and the objection to having the tires subjected to the cleaning solution and the oven temperatures was overcome by the use of overhead conveyors which suspend the tractor off the floor giving easy access to the under side of the tractor in the spray booths.

After leaving the baking oven, the wheels are installed and the tractor set upon the floor by a dip in the monorail track. The tractors are then driven out of the plant under their own power. The capacity of the two finishing units is 440 tractors per day.

Processing Equipment. The Carpenter Metal Products Co., 446 East 131st St., Cleveland, Ohio, is now issuing an industrial 12-page 8½ in. x 11 in. catalog designated as "No. 1" which illustrates a full line of metal baskets for the industrial trade to be used in cleaning, dipping, drying, and so on. Copy free upon request.

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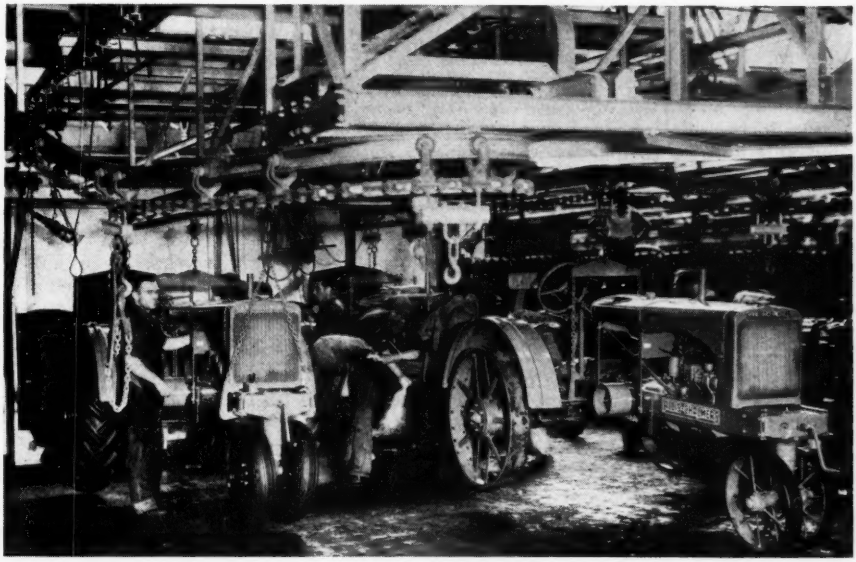


Fig. 1—Illustration showing the exit end of the baking ovens and also several tractors as they appear at the end of the baking schedule.

Program of Third Annual Porcelain Enamel Institute Forum

IN the final program for the Third Annual Forum of the Porcelain Enamel Institute, there are listed the names of twenty-six men of long standing in the industry, who will discuss the problems of applying porcelain enamel. According to Mr. Frank Hodek, Jr., President of the Porcelain Enamel Institute, this group is the most comprehensive list of speakers ever assembled for a discussion of the problems in this country.

Representatives of a number of the larger plants manufacturing porcelain enameled products, are included, along with representatives of frit manufacturing companies, enameling iron producers, and chemical manufacturing concerns. The wide experience manifested by this list of speakers will make it possible for plant men attending this Forum to discuss any phase of enameling work which is done in the United States today.

Not only will the American practice be considered, but the problems of European manufacturers will be presented by members of the Institute of Vitreous Enamellers of England. A group of members representing the British industry, will be present as guests of the Porcelain Enamel Institute and will take part in the discussion.

Bennett Chapple, Vice-President of the American Rolling Mill Company and the "Iron Master" of radio fame, will be the speaker at the banquet on Thursday evening. Mr. Chapple's subject will be "New Frontiers". This dinner is being given in honor of the members of the Institute of Vitreous Enamellers, who are touring the United States. Musical entertainment for the dinner will be provided by Professor Sherman Shoonmaker and Mr. Bruce R. Foote, of the University of Illinois.

On Friday, the meeting will break up into three groups to consider "Hollow Ware", "Cast Iron", and "Sheet Iron". These group meetings are provided so that intensive study of the problems of these three branhes of the industry may be made by interested plant men.

At the close of the afternoon session on Friday, an announcement will be made of future Forum plans. Also a review of the activities of the industry will be presented by a member of the visiting British group.

The committee which has been so successful in arranging to get together this group of prominent enamelers, is composed of: Frank Hodek, Jr., General Porcelain Enameling & Mfg. Company; J. E. Hansen, Ferro Enamel Corporation; R. M. King, Ohio State University and A. I. Andrews, University of Illinois. The committee has already received word from a large number of plant men in the industry indicating that they will be present at this meeting. The University of Illinois has arranged that no other large meetings shall be held in the Champaign-Urbana district this year. A

Reservation Bureau is being set up to work in cooperation with the hotels in these two cities.

The Committee wants again to impress upon members of the enamel industry that this meeting is conducted for plant men. All papers are being prepared to bear upon the practical problems encountered in the application of porcelain enamel, and discussions will be conducted in such a manner that they will be helpful to the practical shop man. The Porcelain Enamel Institute is glad to present this distinguished list of speakers and to invite every man connected with the enamel industry to be present at this Third Annual Forum.

PROGRAM

(University of Illinois, Urbana, Ill.)
October 12, 13 and 14, 1938

WEDNESDAY, OCTOBER 12, 10 A. M.

Registration—2nd floor, Ceramics Building

WEDNESDAY, OCTOBER 12, 2:00 P. M.

(Room 215—Electrical Engineering Lab.)
Presiding: Dr. A. I. Andrews, University of Illinois

1.—Address of Welcome.....Dean M. L. Enger
University of Illinois

2.—Response.....F. E. Hodek, Jr.
General Porcelain Enameling & Mfg. Co.

3.—Review of the Industry.....Emerson P. Poste
Consulting Engineer

4.—The Institute and the Plant Man.....Charles S. Pearce
Porcelain Enamel Institute

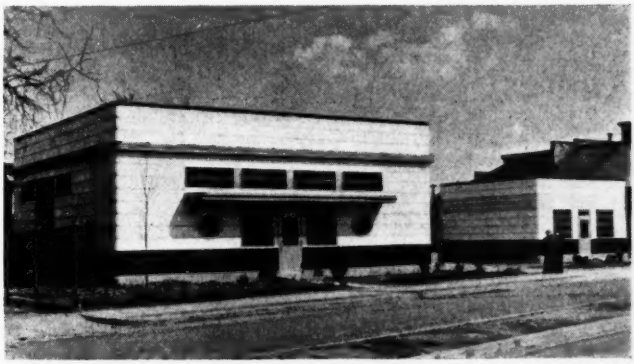
WEDNESDAY EVENING, OCTOBER 12, 8:15 P. M.

(Illuminating Laboratory—200 Electrical Engineering Annex)
Lighting Exhibit and talk—Prof. J. O. Kroehenbuehl

Sub-Station Enameled

The buildings shown in this illustration are built on frameless steel chassis and have a porcelain enamel exterior. More than 3,700 square feet of porcelain enamel paneling were required to cover these two sub-stations. Stainless steel clip strip holds the porcelain enamel panels firmly in place.

(Photo Courtesy The American Rolling Mill Co.)



WEDNESDAY EVENING, OCTOBER 12, 9:30 P. M.

(Urbana-Lincoln Hotel)
Meeting of Technical Research Committee

THURSDAY, OCTOBER 13, 9:30 A. M.

General Session
(Room 215—Electrical Engineering Lab.)
Presiding: G. H. Spencer-Strong, Porcelain Enamel & Mfg. Co.

5.—Tentative Tests for Abrasion Resistance.....W. N. Harrison
National Bureau of Standards

6.—Chipping Resistance of Enamels.....Paul L. Smith
Research Fellow, Porcelain Enamel Institute

7.—Factors Affecting Sag Resistance Properties of Enameling Iron.....Frank R. Porter
Inland Steel Company

8.—Methods of Testing Enameling Stock.....W. A. Alexander
General Motors Corp.—Frigidaire Div.

Luncheon—12:30 P. M.

THURSDAY, OCTOBER 13, 2:00 P. M.

General Session
(Room 215—Electrical Engineering Lab.)
Presiding: F. E. Hodek, Jr., General Porcelain Enameling & Mfg. Co.

9.—British Enameling Practice.....A. England
Blythe Colour Works, Ltd.

10.—Discussion of One Cover Coat Ware.....E. C. Aydelotte
Benjamin Electric Mfg. Company

11.—Ball Milling Practice.....
A. H. Burnham, Jr. and H. Sechrist
Locke Insulator Company Vitreous Steel Products Co.

12.—Sources of Enamel Shop Waste.....W. F. Findlay
Findlay's, Ltd.

THURSDAY EVENING, OCTOBER 13, 7:00 P. M.

Dinner and Entertainment—Urbana-Lincoln Hotel
"New Frontiers"—Bennett Chapple, American Rolling Mill Co.
Entertainment—Bruce R. Foote and Prof. Sherman Schoonmaker

FRIDAY, OCTOBER 14, 9:30 A. M.—HOLLOW WARE SESSION

(Room 203, Metallurgical Laboratory)
Presiding: Jean C. Vollrath, Vollrath Co.

1.—Black Specking of Hollow-ware.....E. C. Dexheimer
National Enameling & Stamping Co.

2.—Fabrication and Trimmings.....W. V. Jared
United States Stamping Company

(A third subject to be announced later)

FRIDAY, OCTOBER 14, 9:30 A. M.—CAST IRON SESSION

(Room 214—Ceramics Building)
Presiding: F. B. Mahoney, Humphryes Mfg. Co.

1.—Problems in Milling and Application of Dry Process Enamels.....
.....Ralph Fry and Frank J. Zvanut
Ferro Enamel Corporation

2.—Automatic Blasting.....E. B. Rich
American Foundry Equip. Co.

3.—Some Observations on Dry Process Enameling.....E. E. Howe
Chicago Vitreous Enamel Prod. Co.

FRIDAY, OCTOBER 14, 9:30 A. M.—SHEET IRON SESSION

(Room 218—Ceramics Building)

Presiding: J. E. Rosenberg, O. Hommel Co. Inc.

1.—Color Matching of White Parts.....G. H. McIntyre
Ferro Enamel Corporation

2.—Circulating Ground Coat Systems.....Ray Harner
Tennessee Stove Works

3.—Burning Tools for Enameling.....D. W. Talbott
Ohio Steel Foundry Co.

Luncheon—12:30 P. M.

FRIDAY, OCTOBER 14, 2:30 P. M.

General Session

(Room 215—Electrical Engineering Lab.)

Presiding: B. T. Sweely, Chicago Vitreous Enamel Product Co.

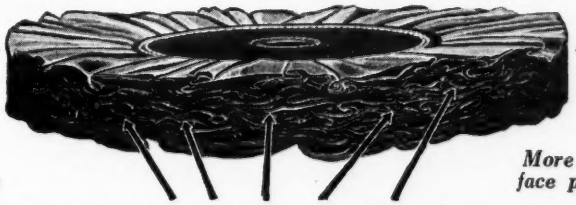
1.—Automatic Spraying & Brushing Equipment.....J. F. Roche, Jr.
Binks Manufacturing Co.

2.—Flash & Roll Seam Welded Assembly for Enameling.....C. G. Bassler
Taylor-Winfield Corp.

3.—Relationship of Some Welding Practices with Certain Enamel Effects.....J. J. Canfield and Alva Taylor
American Rolling Mill Co.

4.—Comparisons of English and American Enameling Plants.....C. P. Stone
Ferramic Industries, Ltd.

5.—Forum Plans for 1939.....F. E. Hodek, Jr.
General Porcelain Enameling & Mfg. Co.



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FINISHES *that aid in Appearance & Utility*

(Right)—Illustration showing a zinc die casting decorated with Kem Art Metal Finish. No undercoat is required and the finish which covers in a single coat bakes to a perfect texture regardless of whether the surface is flat or curved, a bead, or a corner. The finish not only provides beauty and protection but also permits excellent legibility of the arrows, words, and lines which indicate how to properly operate the unit to which this die casting is attached.

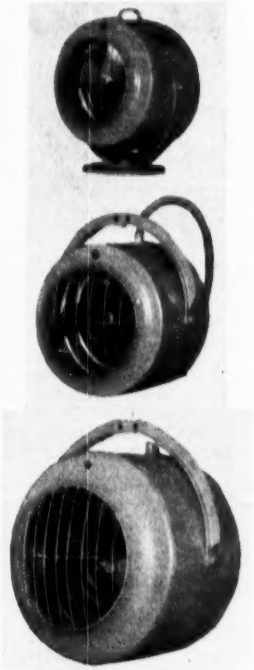
(Photo Courtesy Designers for Industry, Inc.)

(Photo Courtesy Sherwin-Williams Company)

(Left)—This attractive looking Zephyr coffee mill is finished in black and white enamel. The exposed metal parts are plated and satin finish buffed. The modern styling of the unit incorporates features that enhance both its beauty and utility.

(Right)—The aluminum die castings which form the major exterior parts of this light weight packing, checking and testing scale are plated to enhance the unusual styling employed. Variations as little as one sixty-fourth ounce on objects being weighed are registered by means of this scale.

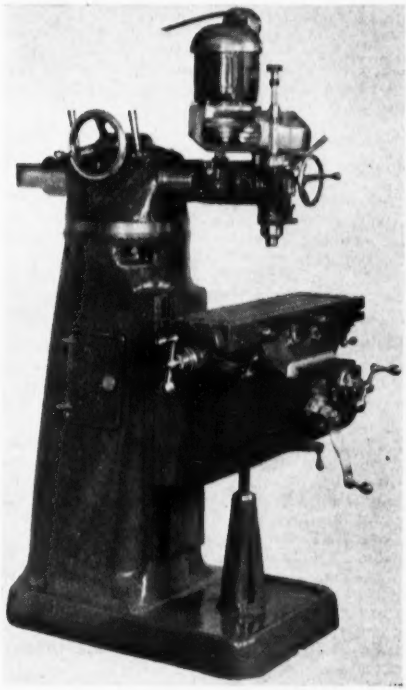
(Photo Courtesy Harold Van Doren Associates, Inc.)



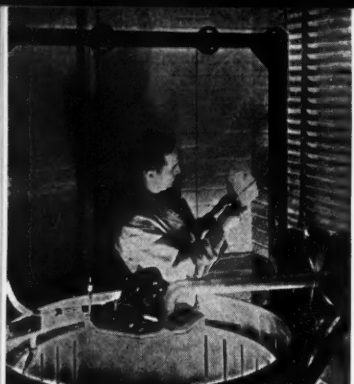
(Photo Courtesy General Electric Company)

(Above)—These forced-convection, suspension style heaters are finished with a smooth coating of baked gray enamel. Heaters of this type afford exceptional compactness and at the same time maximum efficiency.

(Photo Courtesy Bridgeport Pattern & Model Works)



(Right)—An Egyptian lacquer is used to enhance the appearance of this milling machine. Experience has shown that many operators of machine tools of this type take pride in maintaining the original finish and thereby cooperate with plant "good-housekeeping" programs.



NEWS of the Industry

Norton Appoints Sales Research Manager

According to a recent announcement, Mr. R. E. Taylor has been appointed sales research manager of the Norton Company, Worcester, Massachusetts. This position was formerly held by Milton P. Higgins who was recently made resident manager of the Norton electric furnace plant at Chippawa, Ontario. Mr. Taylor has been connected with Norton Company for about 17 years and for the last 12 years has been in sales work in the Chicago district.

Ferro Enamel Makes Addition to Laboratory Staff

Willard Fray has been added to the Laboratory Staff of the Ferro Enamel Corporation, 4150 East 56th St., Cleveland, Ohio. Mr. Fray will specialize in cast iron work. The former connection of Mr. Fray was with Floyd-Wells Company, Royersford, Pennsylvania.

Oakite Announces Divisional Rearrangement

Oakite Products, Inc., 20 Thames St., New York, N. Y., manufacturers of industrial cleaning materials, announce the following divisional rearrangement of their Eastern field sales and service organization, effective immediately.

Due to the serious illness of Mr. J. A. Maguire, its Detroit Division Manager, which will incapacitate him for active work for a considerable period, the Company has appointed Mr. H. C. Duggan to take charge of sales and service in that division.

Mr. Duggan after having served previously both as an Oakite sales representative and division manager in the Midwest for eleven years, came to New England as Division Manager in 1935. His appointment as Detroit Division Manager, therefore, marks his return to an industrial section with which he is thoroughly familiar and he will now be in charge of the sixteen men who comprise that division. His headquarters will be in the General Motors Bldg., Detroit.

As a result of these changes, the Company's New York and New England Divisions have been consolidated into one unit, to be known hereafter as the Northeastern Division. Mr. D. X. Clarin, New York Division Manager, who has been associated with the Company for the past 19 years, will head the eighteen Oakite Sales Representatives in the new consolidated division. His headquarters,

(Left) D. X. Clarin (Right) H. C. Duggan

as heretofore, will be the Company's general offices in New York City.

Electroplating Classes at Ohio Mechanics Institute

According to a recent announcement issued by the Board of Directors of Ohio Mechanics Institute two proposed courses in electroplating will be scheduled as follows:

Electroplating I—Friday, 7:00 to 9:30 p.m. First semester, $16.00; second semester, $10.00. Class Fee, $2.00 per semester. Breakage fee, $5.00 per full year.

This is a combined lecture, demonstration, and laboratory course in practical electroplating. Each solution studied will be discussed in the classroom, and methods of analysis and control will be considered in the laboratory. The subjects covered will include: fundamental principles of electroplating; cleaning methods; the electroplating of copper, nickel, chromium, cadmium, tin, zinc, and silver. Methods of determining the thickness of deposits will be discussed.

Electroplating II—Wednesday, 7:00 to 9:30 p.m. First semester, $16.00; second semester, $10.00.

This course is intended for students who have completed Electroplating I, and for those with some practical experience in electroplating. It will be offered as a series of open forum discussions following brief lectures on subjects of general interest relating to electroplating and metal finishing. The students are invited to suggest plating problems and subjects of particular interest to them.

Classes will be held during the second week of October. For further information write to E. A. Blount, Ohio Mechanics Institute, Parkway & Walnut Sts., Cincinnati, Ohio.

DeVilbiss Training School

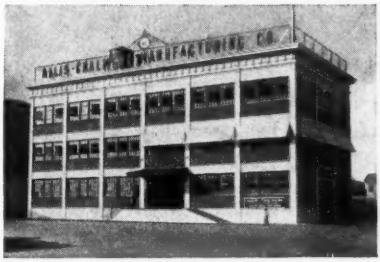
The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio, has made the announcement of the schedule of their training school for the last half of 1938. This training school is open to industrial painters, master painters, automobile refinishers, and all others interested in learning the technique of spray-painting and the use and care of spray-painting equipment.

The training period lasts for one week. Classes will start on the following dates: October 3 and 31 and November 28. Special rates in Toledo hotels and boarding houses near the plant have been obtained by the company for men attending the school.

The classes have been well attended heretofore because of the facilities for study offered by the DeVilbiss Laboratories. It is advisable to enroll in the school as far in advance as possible, since the size of the classes must be limited, and since there will be no training period other than those announced.

Allis-Chalmers Moves Dallas Office and Warehouse

According to a recent announcement, the Dallas, Texas, district office of Allis-Chalmers Manufacturing Company, of which Mr. E. W. Burbank is manager,



Allis-Chalmers New Dallas Office and Warehouse

has been moved to 1800 North Market St., where the power, electrical and industrial divisions of the company will occupy an entire building. The three story building houses not only the company's offices but also its warehouse which carries a large stock of Texrope belts and sheaves, transformers, motors, starters and pumps. It also has a small machine shop where minor repairs can be made.

New Territory Opened by Mr. D. W. Prichard for Pennsylvania Salt Manufacturing Co.

According to an announcement made recently by the Pennsylvania Salt Manufacturing Co., Widener Bldg., Philadelphia, Pa., one of their representatives, Mr. D. W. Prichard, has opened a new sales campaign in the Chicago area. Mr. Prichard is a graduate chemist of Penn State College, Penn State, Pa., and is said to be experienced in both

laboratory and field work. The new line of cleaners which Pennsylvania Salt Manufacturing Co. is introducing is said to have met with a great amount of success in the Philadelphia area. These

Mr. D. W. Prichard.

cleaners are used for heavy duty cleaning and have been found particularly efficient for cleaning metals before plating or coating with paint, enamel, varnish, and so on. These cleaners are also intended for work in cleaning tanks, vats, and containers in process plants and general cleaning of factory equipment.

Connecticut Blower Company Announces Expansion Program

Charles H. Kenney, General Manager of Connecticut Blower Company, P. O. Box 884, Hartford, Conn., announces the opening of a New York office at 155 East 44th St. with J. G. Stalb as District Manager to cover New York City, southern New York State, Long Island, New Jersey and Delaware.

This company also announces five additional sales engineers as follows: Carl E. Swift, of Holland, Mich., for the state of Michigan; John P. Gilboy, of Scranton, Pa., for the state of Pennsylvania; Martin E. Marsalis, of Fort Worth, Texas, for the state of Texas; Charles E. Kreipke, of Evansville, Ind., for the state of Indiana and Chester J. Scanlan, of Bloomington, Ill., for the state of Illinois.

All of these men have had a very broad experience and are exceptionally well qualified to represent the Connecticut Blower Company in the territories assigned.

Technical Director Appointed at Marietta Paint and Color Co.

According to an announcement made recently by The Marietta Paint and Color Co., Marietta, Ohio, Mr. Wayne R. Fuller was appointed as technical director of the company in charge of laboratories and research for both industrial and trade sales divisions. He succeeds Mr. Hamilton A. Derr, who will take charge of industrial product engineering in the field.

Mr. Fuller has spent 17 years in the industry, 5 of which were spent as an industrial sales executive and 12 as a technical director.

American Foundry Equipment Metal Cleaning Laboratory and Demonstration Room

The trend of modern purchasing, especially in the consumer field, has been to submit products to independent research bureau for testing prior to purchase. Also assisting buyers in their search for factual information are the various governmental bureaus which supply a wealth of data on products ranging from silk hose to Russian caviar.

Taking their cue from the profitable results of this practice, many industrial buyers are now demanding more than "paper information" and a chart of specifications when placing their orders. And in line with this trend a number of equipment manufacturers have transformed their old prosaic display rooms into testing laboratories for the "show me" class of buyers who generally form today's buying picture.

One of the first departments of this kind in the foundry equipment field is the new metal cleaning laboratory and demonstration department of The American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Indiana.

This department is housed in a new building where complete facilities are provided for cleaning any type of metal product by the airless Wheelabrator method. Three Tum-Blasts, two Tablasts,

one Utility Cabinet and one Special Production Cabinet comprise the equipment. Ventilation is handled by a 12,000 C.F.M. American Dustube Dust Collector.

The Special Cabinet is designed so that work of any special or unusual shape can be test-cleaned. It is also used where the volume of production desired is in excess of the capacity of the standard Tum-Blast and Tablast machines. Classes of work cleaned in this machine include automobile cylinder blocks, crankshafts, steel sheets, steel drums, and so on.

The Special Cabinet is so arranged that any number of Wheelabrator units can be brought into action at any given position in relation to the work. The conveying mechanism, too, is designed so that the work can be carried through the machine as desired. By experiment, then, the best arrangement of all pertinent factors can be obtained to suit the requirements of the job. With this determined, the design of the cabinet is simplified so that the finished machine will meet the customer's requirements.

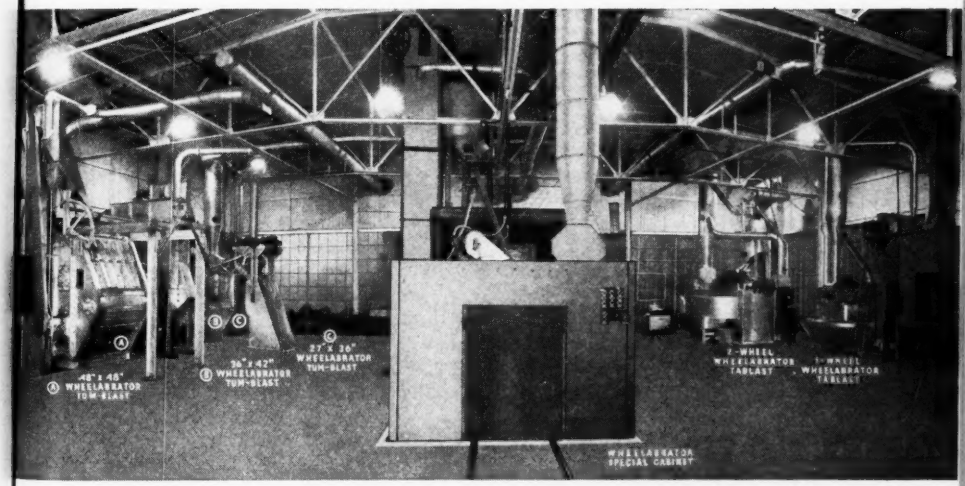
When work is adaptable to the standard Wheelabrator Tum-Blast and Tablast machines, various tests are made to determine the size of machine suitable for handling a given capacity; the speed with which work can be cleaned; the grades and mixtures of abrasive best adapted to the type of work being cleaned; the speed with which the work should be moved through the blast zone; the position of the work with relation to the blast; and other essential factors.

Typical of the many problems regularly submitted to this department are the following: (a) Remove sharp edges and dull the bright finish on aluminum agitators for washing machines. (b) Clean valve tappets with special finish for welding. (c) On zinc alloy die castings remove burrs from inside and obtain smooth finish outside without damaging threads. (d) Remove scale from textile bobbin springs. (e) Clean pipe fittings for galvanizing.

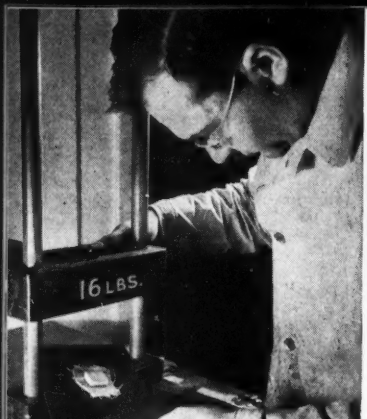
Kendall Appointed Special Engineer

Formerly associated with the Alliance Machine Company, Mr. Homer Kendall has been appointed to handle special engineering problems in sales work with Salem Engineering Company, Salem, Ohio. Mr. Kendall's experience in designing and building special handling equipment for industrial furnaces, all types of crane work, and in the forging industry, furnishes an admirable background for the special engineering work in which he will be engaged. Mr. Kendall is also well known and has many friends in the fields where he has been formerly active.

Mention PRODUCTS FINISHING when writing to advertisers.



American Foundry Equipment Metal Cleaning Laboratory and Demonstration Room



NEW *Plant equipment and* MATERIALS

Hydrion Wide Range pH Test Paper

R. P. Cargille, 118 Liberty St., New York, N. Y., has recently placed on the market Hydrion papers to cover the entire range of pH 1 to pH 14. The new Hydrion set which was recently placed on the market will include the following:

Five types of Hydrion paper—distinct color changes for each pH unit from pH 1 to pH 14.

Fourteen buffer solutions, one for each pH unit. These bring out the specific color for each pH unit.

Comparison plates that facilitate color readings.

The Hydrion set can be used to determine pH wherever acid and alkali solutions are found. The Hydrion set is said to be a definite advance in the practical and economical determination of approximate pH (to well within 0.5 pH units) throughout the entire range.

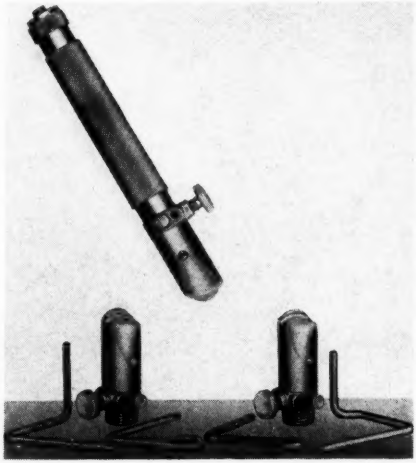
DeVilbiss Precision Paint Striping Tool

A precision paint striping tool which is said to provide a convenient and economical means of applying straight or curved lines of uniform weight and thickness on smooth surfaces has been announced by The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio. The tool may be used for decorative striping in many new product or refinishing operations.

Operating equally as well with paint, lacquer or synthetic enamel, the DeVilbiss Precision Paint Striping tool can be held in the hand like a fountain pen and drawn across the surface to be striped. Single, double or triple lines can be laid side by side at any desired interval by simple adjustment of guides.

The material being applied is uniformly supplied from the paint chamber to the striping wheel by a gear pump located in the head of the tool. This pump operates at a speed commensurate to the action of the wheel.

Requiring no compressed air, the tool is simple to operate and easy to clean. It is furnished with three interchangeable heads for 1/64 in., 1/32 in. and 5/64 in. widths. An extra head for broad ⅛ in. striping is available.



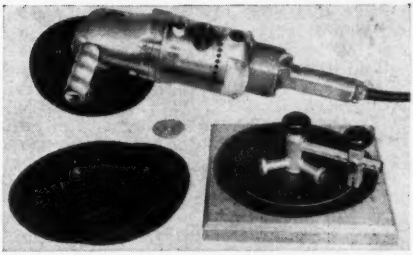
DeVilbiss Precision Paint Striping Tool

Van Dorn 7-9-In. Two-Speed Electric Sander

A versatile two-speed sanding unit, adaptable to use with both 7 and 9-in. abrasive discs, has been announced by the Van Dorn Electric Tool Co., Towson, Md. Developed to eliminate the necessity of purchasing two tools of different speeds in order to use 7 and 9-in. discs, this tool is said to fill a definite need in general sanding operations. As most of the wear on a sanding disc occurs toward the outer edge, it is possible with this machine, to get the maximum wear from a 9-in. disc and by trimming off the worn outer surface, obtain a 7-in. disc that is practically unused. A disc cutter is furnished with each tool and is very simple and easy to use.

The speed adjustment is made by means of a simple gear shift arrangement in the gear housing, which alternately engages two different sets of double gears. Armature and intermediate gears are spiral and the spindle gear is spiral-bevel. The unit is equipped with a patented gear locking pin to facilitate interchange of flexible pads and the gear-shifting adjustment.

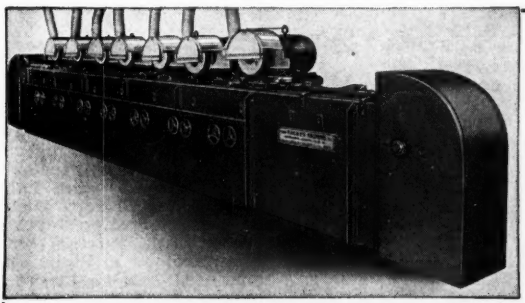
Two mounted pads (7 and 9 in.), together with three 9-in. abrasive discs, are supplied with each tool. The no-load speed for the 7-in. discs is 4200 r.p.m; for 9-in. discs, 2700 r.p.m. A universal motor, operating on alternating or direct current, is standard equipment.



Van Dorn 7-9-In. Two-Speed Electric Sander

Glyco Yumidol

Glyco Products Co., Inc., 148 Lafayette St., New York, N. Y., has just introduced a special grade of sorbitol to be known as "Yumidol." Yumidol is recommended



Increase Production

Varied shapes, sizes and metals are profitably and more uniformly Polished and Buffed on Packer Automatic Machines. Three Types — Straight Line Conveyor — Rotary — Portable Vertical.

New Straight Line No. 2 shown. Special Machines built for unusual requirements.

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POLISH and BUFF *Automatically*

SEND for TIME STUDY on your hard to finish Part. Send sample, production desired and a Proposal will be sent — no obligation.

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as a softener, plasticizer and flexibilizer for adhesives and as a suspending agent for pigments, abrasives, and polishes.

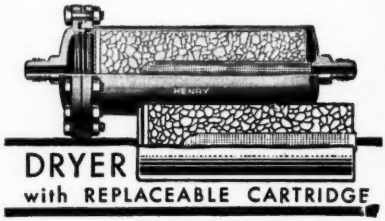
Yumidol is a straw-colored viscous liquid, has a higher specific gravity, viscosity and refractive index than glycerin. It is less hygroscopic in moist air and is said to retain its moisture longer than glycerin in dry air. Yumidol is made from vegetable raw materials and contains no animal matter whatever. Its use is indicated in place of glycerin for purposes where animal matter is objectionable and it can also replace sugar where the latter is undesirable because of physiological or fermenting effects.

Yumidol is soluble in water, alcohol, methanol, glycols and glycerin and most water soluble materials. It is insoluble in oils, fats, waxes, resins and other insoluble materials. It is non-inflammable and non-volatile and does not produce acrolein or other acrid products even on prolonged heating.

Conditioned Air for the Finishing Department

Conditioning air by removing moisture from chemicals in solution and drying the air is said to be possible with the use of the Henry Cartridge Dehydrator now being manufactured by Henry Valve Company, 1001 N. Spaulding Ave., Chicago, Illinois. The Henry dryer has a patented dispersion tube and replaceable dehydrant cartridge. The perforated dispersion tube which exposes the entire volume of dehydrant to penetration by the fluid or air extends along the center axis of the dehydrant column. This construction is claimed to reduce the pressure drop, prevent channeling and resultant loss of efficiency. A strong compression spring provides positive sealing of the dispersion tube into the inlet fitting, preventing bypassing between the outside of the dehydrant cartridge and the inner surface of the dehydrator shell.

Every trace of moisture is removed from the dryers and the replaceable cartridge used by means of an exclusive vacuum process. The dryers then are



Henry Cartridge Dehydrator

sealed with dehydrated air, insuring absolute dryness until moment seal cap is loosened for installation.

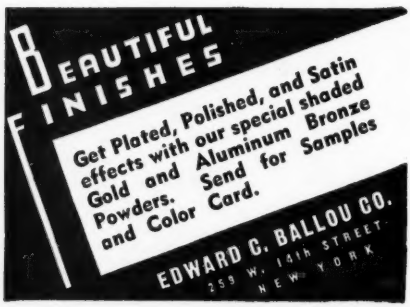
Refill cartridges are said to make the Henry dryers exceptionally simple. Cartridges are available charged with activated Alumina, Drierite, barium oxide, calcium oxide or anhydrous calcium chloride. The flange shell construction of the dryer which is distortion proof speeds removal and replacement of cartridges. The Henry dryers are available in a complete range of capacities.

Flor-Dye for Dustproofing

A dustproofing material known as Flor-Dye for application on concrete floors to render them dustproof and to add color to the floor surface has been placed on the market by Truscon Laboratories, 1700 Caniff St., Detroit, Michigan. Flor-Dye is said to penetrate into the floor and becomes an integral part of the concrete surface. It must be applied on an unpainted surface in order to perform properly. It seals the pores, prevents absorption of staining material such as oils and greases and provides a surface that can be kept clean. Flor-Dye is available in a range of colors.

Gast Speed Boy Model A Spray Painter

Designed for requirements where more capacity than that furnished by a ¼ h.p. spray painter is the Gast Speed Boy Model A Spray Painter which has recently been placed on the market by Gast Mfg. Corporation, Bridgman, Michigan. This unit is equipped with a 1/3 h.p. motor and in addition to the larger


BEAUTIFUL FINISHES
Get Plated, Polished, and Satin effects with our special shaded Gold and Aluminum Bronze Powders. Send for Samples and Color Card.
EDWARD G. BALLOU CO.
259 W. 14th STREET NEW YORK

Capacitor type motor, this new unit features a production size gun, pressure feed cup with large opening and quick-clamp cover, rotary compressor, ball bearings, twin cooling fans, maximum capacity and non-pulsating delivery of

Gast Speed Boy Model A Spray Painter

air without storage tank.

It is stated by the manufacturer that the Model A machine is designed to operate continuously as a heavy duty machine and is built for maximum portability and economy.

Excelsior Automatic Bumper Polishing and Buffing Machine

An automatic bumper polishing and buffing machine, to be known as the "No. 27-B-R", has been placed on the market by the Excelsior Tool & Machine Co., Ridge Ave., East St. Louis, Ill. The unit consists of a rocking table twin wheel polishing and buffing unit that is said to finish bumpers of any height or shape and can be automatically finished from end to end.

In operation, bumpers are reciprocated back and forth under the polishing wheels the necessary number of passes to obtain the desired finish, the rocking table and corresponding cams, which are adjustable to the various heights and shape of the bumper, equalize the wheel pressure over the entire face of the bumper. Bumpers are held in place by quick release spring holding fixtures which are designed to allow a floating action to position the bumpers centrally their entire length with the contour of the polishing wheels.

A cam shaft which applies the rocking motion to the carriage on which the bumpers are located, is guided at each end by hardened steel rollers engaged in the guide channels. The guide channels are adjustable to correspond with the shape of the bumpers. The twin carriages can be shifted independently as when 2 single wheel machines are used.

The polishing operation is continuous, 2 bumpers being polished at the same time independently of each other and requiring removal only when the desired finish has been obtained.

The spindles of the unit are of special alloy steel journaled in over-size high grade ball bearings and assembled in dust-proof housings, which accommodate polishing or buffing wheels up to 16 in. diameter, 6 in. face, and 1½ in. hole.

Sturtevant Hydro-Clone Dust Collector

The Hydro-Clone Dust Collector illustrated herewith is now being marketed

Presenting--

THE LUPOMATIC PROCESS

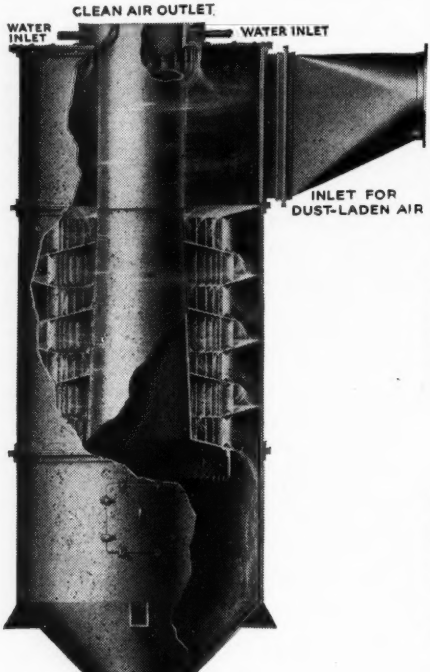
A new method * * Completely automatic * * for polishing, cutting down and coloring metal parts of every description on a mass production basis. Leading manufacturers have already adopted this new method of finishing. Brass, steel, nickel silver and zinc die cast parts can be processed to a high grade finish superior to that obtainable by hand polishing at a savings of as much as 92%.

Write today for complete details or send samples for test purposes so that you may see how this amazing process will improve the appearance of your particular product and bring you extra profits.

LUPOMATIC TUMBLING MACHINE CO. INC.

4511 BULLARD AVE. NEW YORK, N. Y.

by Sturtevant Mill Company, Park & Clayton Sts., Dorchester, Boston, Massachusetts. The Sturtevant Hydro-Clone



Sturtevant Hydro-Clone Dust Collector

system of dust and fume suppression is designed to suppress dust and fumes arising from manufacturing processes and operations.

The Hydro-Clone unit is designed to separate the dust from the air by a combination of centrifugal force and wet impingement and washing. The dust is precipitated in the form of sludge in a dewatering tank which is a part of the system and the water is recirculated through the Hydro-Clone, thus wasting no water. The Hydro-Clone unit will not freeze during winter operation.

When it is desirable to collect usable dust in a dry form, the dust is separated in a Sturtevant Dry-Clone which connects with the Hydro-Clone where the fine dust is suppressed as sludge. Thus, two products are obtainable, a large percentage of coarse usable material and a sludge containing the dust. If it is desirable to convert all of the dust to sludge, then the Dry-Clone can be dispensed with.

In handling fumes, smoke, and dust at high temperatures, a combination of the Dry-Clone and the Hydro-Clone is used. In this case the Dry-Clone serves as a pre-cooler and a trap for the heavy dust and the air passes to the Hydro-Clone for final cleaning. The Hydro-Clone is entirely devoid of moving parts or spray nozzles.

Nickelite Brightener

A brightener for nickel barrel plating to be known as "Nickelite" has been placed on the market by Platers Research Company, 74 Grand Ave., Brooklyn, New York. Nickelite is said to give a brilliant and highly lustrous finish to the deposit.

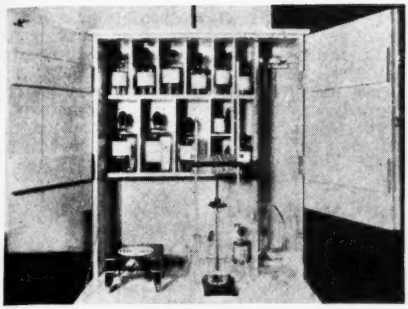
Nickelite is said to work well over wide and changing pH values, conforming to nickel barrel plating solutions.

Alkaline Zinc Solution Analytical Test Kit

An Analytical Test Kit for the analysis of cyanide zinc solutions has been placed on the market by Hanson-Van Winkle-Munning Co., Matawan, N. J. The outfit consists of the chemical solutions and apparatus necessary for making the analysis, arranged in a suitable cabinet. When the two doors of the cabinet are open and the bottom portion of the cabinet lowered, the bottles of solution are within easy reach, and ample working space is provided.

Solutions are analyzed according to the methods given in the booklet "Sim-

For a real good polishing job use
KEYSTONE EMERY
TURKISH—NAXOS—AMERICAN
KEYSTONE EMERY MILLS *Write for Samples* 4316 Paul St., Phila., Pa.



Alkaline Zinc Solution Analytical Test Kit

ple Methods of Analyzing Plating Solutions" issued by the company. These methods are standard, simplified and shortened, but nevertheless accurate and reproducible. It is stated that anyone, regardless of previous experience, can learn in a few hours to control plating solutions by these methods.

The solutions are carefully standardized and contained in chemically resistant glass-stoppered bottles. The proper factors given on the labels convert readings directly into ounces per gallon of the particular constituent sought. The parts of the Analytical Test Kit such as beakers, burettes, funnels, and so on, that are subjected to heat are made of pyrex glass. The cabinet occupies but a small space and can be stationed in any convenient place in the plaitng room. By simply opening the cabinet, the equipment is ready for operation.

Consistent results can be obtained only by carefully controlling a bright or regular zinc solution.

Autovent Steam Unit Heater

A small size unit heater has been added to the line of Autovent super type suspended steam unit heaters by Autovent Fan & Blower Company, 1811 N. Kostner Ave., Chicago, Illinois. This unit is said to be ideal for economically heating storage spaces, small rooms, isolated offices, and so on. This quiet operating, practical size unit has a rate of 61 ft. of equivalent direct radiation and a capacity of 14,640 b.t.u. when operated on steam pressure with entering air pressure of 60 deg. F. The heater casing dimensions are 10 in. wide, 13½ in. high and 7½ in. deep. The motor is suitable for constant or two speed operations.

The specially designed propeller fan, which forces heat through the adjustable vanes on the front of the heater, has a capacity of 440 cu. ft. per minute. The heated air is forced down to the floor and into corners just as efficiently as any large unit heater. The unit is attractively finished in a golden bronze, crackle finish.

Westinghouse Panel Instruments

Instruments for the measurement of direct current, rectox types, thermocouple types and alternating current have been placed on the market by Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pennsylvania. These instruments are said to employ two types of mechanism. For direct current circuits and for rectox and thermal types the permanent magnet moving coil principle of operation is used.

For the alternate current circuits, the repulsion iron vane principle of operation is used. They are rated at 750 volts which corresponds to a test of 2500 volts between terminals and the panel. Capacities as low as 20 microamperes are available in moving coil types. Self-contained ammeters of 50 amperes and voltmeters of 200 volts are available

Whether it's a heavy-duty job, or delicate jewelry finishing...

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SAVES time

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Recommended by 50 years of brilliant service on the most varied and exacting cleaning jobs.

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RUMFORD CHEMICAL WORKS

RUMFORD, RHODE ISLAND

Westinghouse Panel Instrument for projection mounting

thus providing the economical maximum in variety of ratings with a minimum of external accessories.

Some of the distinguishing features of this line of instruments are longer scales, flush and projection rectangular forms, flush rectangular case forms available in vertical or horizontal arrangement of front plate, all forms of covers interchangeable with one standard line of mechanisms and bases, and gaskets sealed, making the instrument dust and moisture proof.

Du Pont Clear Finishes for Industrial Use

A new line of clear finishes for industrial use designated as the "RC-900" line has been placed on the market by the Finishes Division, E. I. du Pont de Nemours & Company, Wilmington, Delaware. This development is said to represent another step in the expansion of the methacrylate resins into the finishing field.

Finishes of a methacrylate base afford unusual adhesion and flexibility over bare, non-ferrous metals such as aluminum, chromium and brass. They deposit a glossy, water-white film which dries rapidly by evaporation. The coating is hard and non-yellowing, resistant to acids, alkalies and alcohol. The RC-900 Clear Finishes are said to possess satisfactory durability under outdoor exposure. These finishes may be applied by any of the usual methods, such as brush, spray or dip.

S-W Satin-Glo Metal Office Equipment Finish

The Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland, Ohio, has placed on the market a specialty finish for metal office furniture, business machines, and so on, to be known as S-W Satin-Glo. This type of finish is offered in two spraying and two dipping qualities for the requirements of the metal furniture field.

S-W Satin-Glo is said to produce a finish of exceptional beauty, lustre and mar-resistance in one coat. It is also resistant to severe abrasion, perspiration, chemicals and cleaning soaps.

Satin-Glo is compounded around a chemically evolved vehicle, developed to produce a finish of maximum toughness.

Pyrex Gage Glass

For use on all types of water tanks and containers is the new Pyrex Gage Glass which has been developed by the Corning Glass Works, Rapeck St., Corning, New York. The Pyrex Gage Glass is available in lengths to 24 in. and diameters from ½ to 1 inch. A transparent red line is an integral part of the gage glass and is said to assist in showing water level in the glass from a considerable distance. This transparent line appears to expand and fill the entire tube with red color for that portion below the water line.

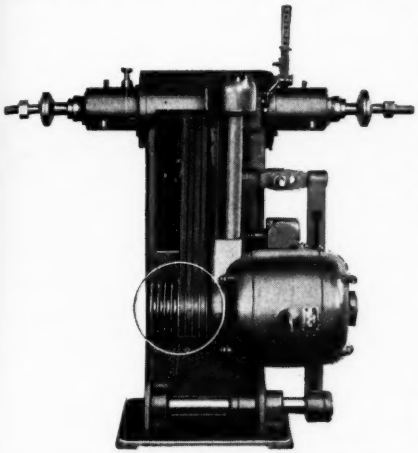
Pyrex Gage Glass is machine drawn, retains its accuracy of size, thermo-shock resistance and clarity in service.

Hammond Two-Speed Polishing and Buffing Lathe

An addition to the Hammond Machinery Builders, Inc., 1600 Douglas Ave.,

Borolon TRADE MARK ABRASIVE POLISHING GRAIN
Strictly first quality aluminum oxide abrasive grain manufactured in our own electric furnace plant. Specially prepared and treated for most efficient polishing performance. Write for samples.
ABRASIVE COMPANY GRINDING WHEEL AND ABRASIVE DIVISION OF SIMONDS SAW AND STEEL CO. PHILADELPHIA, PA.

Kalamazoo, Mich., line of polishing and buffing equipment is the Two-Speed Rite-Speed Polishing and Buffing Lathe. Change of speeds is said to be effected easily and quickly by adjusting the posi-



Hammond Two-Speed Polishing and Buffing Lathe

tion of the motor by a convenient belt tension nut and transferring the belts from one set of sheaves to the other.

A heavy enclosed steel belt guard is standard equipment and a door is located at the side of the unit for convenience in transferring belts on the motor sheaves. The belt guard does not have to be removed when changing speeds. The spindle sheave is accessible by means of a hinged steel cover.

Standard equipment includes a combination switch and brake, heavy one-piece manganese ground spindle with flat top threads operating on ball bearings, magnetic switch, and a motor air cleaner unit with motor. A totally enclosed fan-cooled motor is optional.

Wade Shop Envelope

For use in handling shop orders, recording sheets, and blue prints through the shop, the Wade Instrument Company, 1663-A East 118th St., Cleveland, Ohio, has brought out an envelope especially designed for this service. The envelope has a stiff metal back that is rust resisting, and a thick non-inflammable, transparent Lumarith front. Shop prints, orders, cards, and so on, can be read without removing from the envelope.

A flare at the top stiffens the Lumarith and allows papers to slide in and out freely. Two pressed spots at the bottom hold the Lumarith in place, but it can easily be removed for cleaning and replaced. All edges have been beveled for safety. The envelop is made in three stock sizes of **6x9, 9x12, and 12x** 18 in., but any size or shape can be supplied by order.

Wade Shop Envelope

"Milwaukee" Three-Speed Heavy-Duty Sander

A three-speed 9-in. heavy duty portable electric tool has been brought out by the Milwaukee Electric Tool Corporation, 120 N. Water St., Milwaukee, Wis. This streamlined tool is said to be actually three machines in one—a two-speed sander, a feather-edger and a polisher.

Improve Your Finish 100%

MAGIC TACK RAGS remove specks, lint and sand particles--- bring out that deep, smooth luster, produce a faultless surface for white or colored finish. Why use "home made" tack rags when you can buy MAGIC TACK RAGS at trifling cost! They are tackier, do not dry--- are dust-proof and spontaneous combustion proof. Packed in dozen and gross lots or more. Made only by the

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Toledo, Ohio, U. S. A.
If your dealer does not carry Magic Tack Rags, write us for sample.

A simplified form of gear shift requires only the moving of a lever on the side of the machine to change speeds. The low speed with the curved-face

"Milwaukee" Three-Speed Heavy-Duty Sander

flexible steel backing pad is used for feather-edging paint with a special sandpaper disc, and for polishing with a lambs-wool pad. The intermediate speed is used with the 9-in. flat nested spring steel backing pad for grinding off high spots and for metal surfacing. The high speed is used with the 7-in. flat nested spring steel backing pad when the abrasive disc is trimmed from 9 to 7-in. diameter. According to the manufacturer, the Milwaukee Three-Speed Heavy-Duty Sander makes it possible to complete the entire job of removing paint, sanding, feather-edging and polishing at the correct speed.

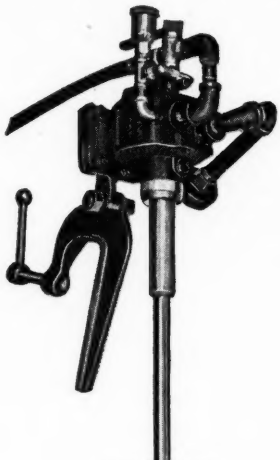
Eclipse Air-Operated Agitator

Eclipse Air Brush Co., Inc., 390 Park Ave., Newark, N. J., has developed and is now marketing an air-motor operated agitator known as the "Pneumix Type B" to handle batches of material up to 100 gallons. The outstanding feature of this stirring device is its safety element in that it is spark-proof and cannot heat. This feature is particularly desirable where inflammable organic compounds and solvents must be handled.

The speed of the Pneumix is variable from 30 to 6000 r.p.m., requiring 5 to 50 pounds pressure. The speed is controlled by the air intake on the motor. This is an important item where a change of the viscosity of the material takes place during the mixing operation.

Quiet operation is assured by the installation of a muffler in the exhaust line. Splash-proof performance is provided by having the two propeller blades of the mixing unit "throw" toward each other. The entire construction has been so designed that all internal working parts are protected against splashing or dripping. The upper propeller is removable so that the unit can be used for mixing smaller amounts of material.

The shaft of the Pneumix Type B is available in chromium plated steel, stainless steel or bronze, and the blades



Eclipse Air-Operated Agitator

in chromium plated brass or stainless steel. Parts made of other materials are also available. The shaft is removable so that it can be replaced with an-

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• INSURES PERFECT BOND BETWEEN METAL AND PAINT.
• MAKES THE METAL SAFE FOR PAINT.
Ideal for preparing Iron, Steel, Aluminum, Aluminum Alloys, Galvaneal, Galvanized Iron, etc., for paint finishes. Has been used on more than ten million units.
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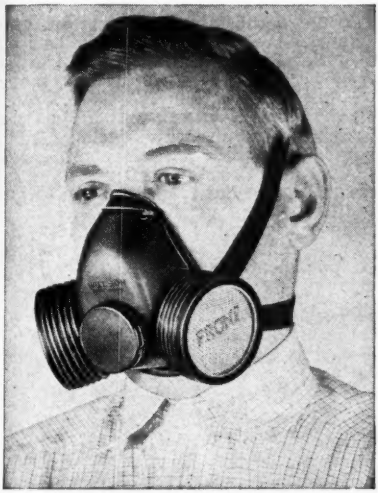
NEILSON CHEMICAL CO.
6564 BENSON ST. DETROIT, MICH.

other of a different metal when a change in material makes it necessary. The over-all size of the Pneumix Type B is 40 in. x 6 in. and the weight is 17 pounds.

Willson Cartridge Respirator

Willson Products, Inc., 271 Thorn St., Reading, Pa., has announced a new low resistance Chemical Cartridge Respirator especially designed for paint spraying, and for use in light concentrations in organic vapors and acid gases.



Willson Cartridge Respirator

This respirator, which is available in either 190 or 100 cc. content, is said to have several unique and distinctive features. It employs two inexpensive replaceable cartridges which result in a very low breathing resistance. The use of extra large cartridges affords an unusually large degree of protection.

The new form-fitting rubber face piece conforms to the face, out of the way, and permits maximum visibility. Spectacles or goggles may be worn with absolute comfort and the entire respirator is extremely compact.

Three separate chemical fills are available, depending upon the type of work with which the respirator is to be used.

Subox All-Service Aluminum Paint

Subox, Inc., 344 River Rd., North Arlington, N. J., is now furnishing their Aluminox in a new All-Service form of packing. The unit is composed of a 12-gallon can furnished with a spigot containing the vehicle, and a high grade aluminum paste which forms the pigment. The All-Service unit is intended to serve particularly small manufacturers who may want to use an aluminum paint as a product finish or as a maintenance paint.

By adjusting the proportions of the pigment and vehicle, Aluminox makes a desirable product finish. When force dried, a hard coating is obtained. The All-Service unit is said to be convenient, aids in the prevention of spillage and waste and requires a minimum amount of space for storage. Paste and vehicle can be ordered separately.

Fostoria Socket Seal

To prevent the entrance of certain foreign particles into the space between the lamp base and the socket, The Fostoria Pressed Steel Corporation, Fostoria, Ohio, has developed the Fostoria Socket Seal illustrated herewith. The seal is a molded rubber collar for medium base lamps, the seal fitting over the open end of the socket so that when the lamp

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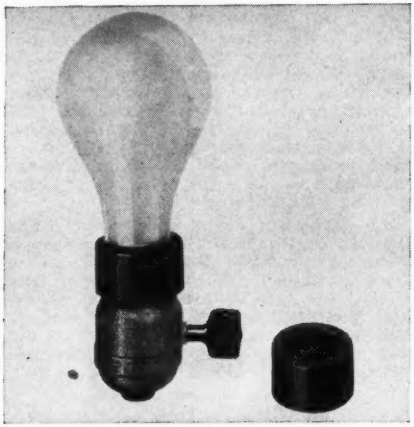


Fostoria Socket Seal

bulb is inserted, the socket-lamp union is fully protected. This construction is said to prevent frequent shorts resulting from dirt, chips, grindings, cutting oils and so on, which might enter the socket. The lamp end of the seal is feather-edged so that the seal fits snugly around the lamp bulb base. Fostoria Socket Seals are packed 25 to the box.

Kaylor Barrel Funnel

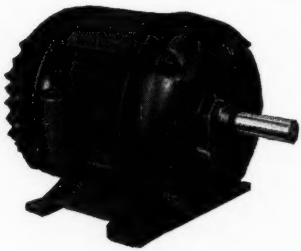
Kaylor Company, 1000 W. Washington St., East Peoria, Illinois, has placed on the market a barrel funnel which is said to permit filling through an end bung without uplifting. The barrel funnel is of 5 gallon capacity and is made of steel and is of welded construction. It is fitted with a rod-foot assembly that rests against the end of a drum or barrel while its spout is in the bung to hold it in position for filling a drum that is lying on its side. A welded lug on the spout holds inside the bung so the funnel will not come away without being lifted out.

The body of the barrel funnel is 12 in. in diameter, has a reinforcing ring around the top to stand up in severe service and is galvanize finished.

Wagner Repulsion-Induction Single-Phase Motor

The Wagner Electric Corporation, 6400 Plymouth Ave., St. Louis, Mo., has recently developed an improved integral-horsepower repulsion-induction motor to be known as the Type RG. According to the manufacturer, the motor has electrical characteristics which make it desirable for operating air compressors, viscous liquid pumps, refrigerant compressors, conveyors, and so on. Outstanding features of the Type RG motor are high starting torque, low starting current, positive starting in low voltage, high power factor, and efficient operation.

The Wagner Type RG Repulsion-Induction Single-Phase Motor is available in three sizes from 1 to 3 h.p., in both vertical and horizontal types.



Wagner Type RG Repulsion-Induction Single-Phase Motor

Flatjet Spray Nozzles

A line of spray nozzles for metal cleaning processes and various industrial washing operations has been placed on

Flatjet Spray Nozzles

WATER WHITE LACQUER

Is perfectly transparent when dry; excellent for protecting your product and adding attractiveness at a low cost. Withstands seasonal changes and age, thus promoting longer life. Is easily applied. Sample on request.

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CHAS. COOPER & CO.
186 Worth St. New York, N. Y.

the market by Spraying Systems Co., 4922 W. Grand Ave., Chicago, Illinois.

The "Flatjet" type nozzle is said to deliver a sharp, flat, hard-hitting spray with uniform distribution. Standard nozzles are made of brass, but these nozzles are available in other metal when required to meet chemical and corrosion resistance.

The Flatjet type nozzles are available in male pipe connections from ¼ to ¾ inch and in capacities ranging from 1 to 20 G.P.M. at 40 pounds pressure.

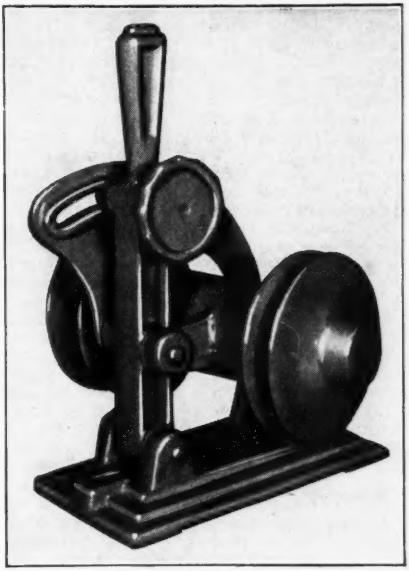
M.S.A. Industrial Vapor and Dust Masks

In order to combat hazardous vapors and dusts, the Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa., has designed and is now manufacturing a wide range of Industrial Masks. The M.S.A. Industrial Vapor and Dust Masks with a broad selection of canisters is now available for protection against practically all poisonous industrial gases.

Outstanding features of the M.S.A. Industrial Masks are their light-weight wearing comfort and design which permits complete freedom of action. Through its use, the wearer is protected but not hampered in the normal performance of his duty.

Hi-Eff Variable Speed Transmission

The "Hi-Eff" Vari-Speed Control shown in the illustration is being introduced by the Columbia Vari-Speed Company, Wheaton, Ill. It incorporates the adjustable V-pulley principle in a new single shaft design. The transmission consists of a single shaft in which are two adjustable V-belt pulleys, which vary in diameter as their distances from the driving and driven pulleys are



Hi-Eff Variable Speed Transmission

changed. It offers infinite speed selectivity within ratios of 5 to 1, and tests show it to be over 90 per cent efficient.

The distinctive features of this transmission are single shaft design, compactness, efficiency, economy, only one place to lubricate, self-centering compensatory pulleys, ease of installation, and the use of standard V-belts. It is offered in sizes from ¼ to 7½ horsepower.

Goodrich Conveyor Belting

A conveyor belting which is constructed of plies of weftless cords such as are

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used in truck tires is now being marketed by The B. F. Goodrich Company, Akron, Ohio. This type of construction is said to give a carcass in which every tension member is completely surrounded and insulated with rubber to increase its ability to absorb and withstand shock. Since the cords have no transverse or filler treads obstructing their freedom of movement, they are free to distort themselves.

The belting is said to have extreme transverse and longitudinal flexibility. It is also said to have great resistance to moisture and acid penetration, due to the fact that the carcass is impregnated with rubber. Each individual cord is surmounted by a layer of rubber which protects it against penetration of moisture and corrosion. Goodrich Conveyor Belting is available in any length, width, and number of plies. This type of conveyor belting must be spliced by vulcanizing.

Sterling Gyro Electric Sander

A new type portable electric sanding machine to be known as the "Sterling Electric Gyro Sander" has been announced by Sterling Products Company, 2457 Woodward Ave., Detroit, Michigan. The movement of the sanding pad on this machine is said to be unique in machine sanding and closely simulates the hand sanding motion. The abrasive paper attached to the bottom of the pad has a movement whereby each particle of the abrasive moves in a centroid of approximately 5/16 of an inch. The features of this movement are said to be extremely high cutting speed, uniform finish and the elimination of chasing and graining effects.

The Sterling Electric Gyro Sander is said to be efficient for heavy production jobs and also flexible enough for the lightest work. Perfect balance, and the light weight of 3¼ pounds, plus the compact design and dimensions of the sander head provide a comparable fit to

Sterling Gyro Electric Sander

the hand, thus making the Gyro extremely responsive to the guidance of the operator.

The machine is driven by a heavy duty ¼ h.p. 3450 r.p.m. electric motor. Power is transmitted to the sander head by means of the flexible shaft. Special abrasive paper is not required and from one to five sheets of abrasive may be attached to the sanding pad at one loading.

Three distinct types of motor mountings are provided; the bench plate type for use on the work bench, the ceiling suspended type with the motor suspended from the ceiling or overhead

SEVERANCE MIDGET MILLING CUTTERS
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trolley by means of a yoke and adjustable head pedestal model with the motor mounted on three-leg caster base.

Pyramid Color Stripe Mouldings. The latest innovation in Pyramid Mouldings is described in this folder which is now being issued by Pyramid Metals Company, 455 N. Oakley Blvd., Chicago, Illinois. The colors available with Pyramid Metal Mouldings are red, blue and black stripes. Other finishes available include brass, bronze, copper and stainless steel. The color striping is applied by a special process and recessed to insure permanence.

The Pyramid Snap-On feature is said to make installation of the moulding easy and economical on new work or for remodeling. First a track is laid and then the moulding is snapped on the track. This method is said to permit smooth unbroken lines that are desirable to modern decoration. This type of moulding can be used for exterior or interior trim. A copy of this folder will be sent free upon request.

"Parker A.I.A. File No. 25-C-31." This is the designation of a beautifully illustrated 16-page catalog which is now being issued by Parker Rust-Proof Company, 2172 East Milwaukee Ave., Detroit, Michigan. Parkerizing has been used for years as a rust inhibitor on ornamental iron and steel, both as a base for paint and as a substantial finish itself for certain indoor articles. Now, Bonderizing, a faster but equally efficient process, has been adapted to treating such products as steel windows, screen frames, air conditioning units, medicine cabinets, galvanized sheets and many other building accessories. This new finishing system for architectural iron and steel products which is said to increase finish durability is described in this catalog. Copy free upon request.

The Laboratory. Volume Ten: Number One of this publication is now being issued by Fisher Scientific Company, 711 Forbes St., Pittsburgh, Pennsylvania. Articles dealing with microfilming, micro electrophotometer attachment, alkacid and specimen mounting press are included in this issue. Copy free upon request.

"Grobet Catalog R-28". This is the designation of a catalog now being issued by Grobet File Corp. of America, 3 Park Place, New York City. Described in this catalog is the complete line of rotary files which consist of hand cut rotary files, hand cut rotary rasps, milled cut files for drill presses, and milled cut files. These four classifications of files are made either in high speed steel or chrome steel. Copy free upon request.

Cleaning Cement in the Finishing Department. Magnus Chemical Company, 13 South Ave., Garwood, N. J., is now issuing a 12-page folder describing the various applications of Magnus Cement Cleaner. Laborious scraping or scrubbing and long overnight soaking is said to be unnecessary with Magnus Cement Cleaner. It works well with hot or cold water and leaves no white cloudy streaks. The compound is completely soluble by stirring into water and on application quickly penetrates every crack and draws grease and oil to the surface. It is non-inflammable, non-poisonous and contains no free alkali. A copy of the folder describing Magnus Cement Cleaner will be sent free upon request.

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To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. **Automatic Polishing Machines**
   The Packer Machine Co., Meriden, Conn., has issued a catalog illustrating and describing the Packer line of automatic polishing and buffing machines. See Page 81.

2. **Industrial Ovens**
   Two new bulletins giving full particulars on air heaters and industrial ovens. J. O. Ross Engineering Corporation, 350 Madison Ave., New York, N. Y. See Third Cover.

3. **Rust-Proofing Methods**
   New books describing the Parker Processes are available to manufacturers and technical men. For more than 22 years the Parker Rust-Proof Company, 2172 E. Milwaukee Ave., Detroit, Michigan, has devoted its entire time to rust-proofing methods.

4. **Steam Specialties**
   Illustrated with 22 actual examples, this booklet outlines a practical method for judging how well steam specialty equipment is made to give long service without repairs. The International Nickel Company, Inc., 67 Wall St., New York, N. Y.

5. **Protective and Decorative Finishes**
   Hilo Varnish Corporation, 42-60 Stewart Ave., Brooklyn, N. Y., presents Bulletin No. 15 titled, "The Five Hilo Rip-pls".

6. **Dust Collecting Systems**
   An attractive 24-page catalog has just been issued by The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati, Ohio, which illustrates and describes many K. & B. Dust collecting Applications installed in numerous industries. See Page 23.

7. **Black Finish To Steel**
   A 4-page bulletin outlining the Pentrate Process of applying an attractive, low-cost black finish to steel, through a process of chemical action. Heatbath Corporation, Springfield, Mass. See Page 55.

8. **Metal Cleaning Hints**
   An interesting bulletin giving details on Metalprep Rust and Grease Remover. Tells how Metalprep makes metals safe for paint. Neilson Chemical Co., 6564 Benson St., Detroit, Mich. See Page 88.

9. **Abrasive Bond**
   An 8-page folder describing Nuglu for setting up polishing wheels and belts. J. J. Siefen Company, 1936 W. Lafayette Blvd., Detroit, Mich.

10. **Alkali Cleaning Compounds**
    A new bulletin has been released by Detroit Rex Products Co., 13017 Hillview Ave., Detroit, Mich., describing Triad Alkali Cleaning Compounds.

11. **Plating Barrel**
The Udylite Plating Barrel is completely detailed in a bulletin published by the Udylite Company, 1651 E. Grand Blvd., Detroit, Mich.

12. **Spray Booths and Ovens**
Newcomb-David Company, Inc., 5741 Russell St., Detroit, Mich., has issued a 24-page catalog illustrating and describing typical N-D Spray Booths, Industrial Ovens, Metal Parts, Washers and Ventilating Equipment. See Page 59.

13. **Bibliography of Technical Articles**
A 16-page bibliography of more than 300 articles on the subject of pickling, hot-dip galvanizing and hot-dip tinning written by Wallace G. Imhoff is now being issued by The Wallace G. Imhoff Co., Vineland, N. J.

14. **Flocking Units**
A 4-page catalog dealing with a phase of modernization with Paasche Flocking Units for art display and industry. Paasche Airbrush Co., 1910 Diversey Parkway, Chicago, Ill. See Page 63.

15. **Metal Polishing**
The many applications of the polishing materials marketed under the name of Lionite are described and illustrated in this 12-page catalog. General Abrasive Co., Inc., 3508 Hyde Park Blvd., Niagara Falls, N. Y.

16. **Rotoblast Equipment**
Rotoblast barrels and tables for the production of blast cleaning of gray iron, steel, alloy, malleable and nonferrous castings are described in this catalog now being issued by Pangborn Corporation, Hagerstown, Md.

17. **Nickelite**
A 4-page folder describing Nickelite, an addition agent for nickel barrel plating solutions. Platers Research Company, 74 Grand Ave., Brooklyn, N. Y.

18. **Rotary Files**
Catalog R-28 illustrates more than 200 different kinds of rotary files, hand cut, rasp cut and milled cut. Grobet File Corp. of America, 3 Park Place, New York, N. Y.

19. **Anti-Corrosive Coatings**
A 4-page catalog describing features and field of application of the gray lead emulsion known as Subox. Subox, Inc., 344 River Rd., North Arlington, N. J.

20. **Cleaning Castings**
Catalog describing the Rotoblast method of airless blast cleaning. Pangborn Corporation, Hagerstown, Md.

21. **New Wrinkles**
A 12-page catalog published by New Wrinkle, Inc., Mutual Home Bldg., Dayton, Ohio, describing in detail the various types of wrinkle finishes available for product finishing.

22. **Cameron pH Meters**
A complete resume of the structural features and applications of the Cameron glass electrode pH meter which is marketed by Wilkens-Anderson Company, 111 N. Canal St., Chicago, Ill.

23. **Enamelers Reference No. 2**
The subject of enamel storage is very briefly and concisely explained by Mr. H. G. Wolfram, Manager of Technical Opeerations, The Porcelain Enamel & Mfg. Co., Pemco & Eastern Aves., Baltimore, Md.

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